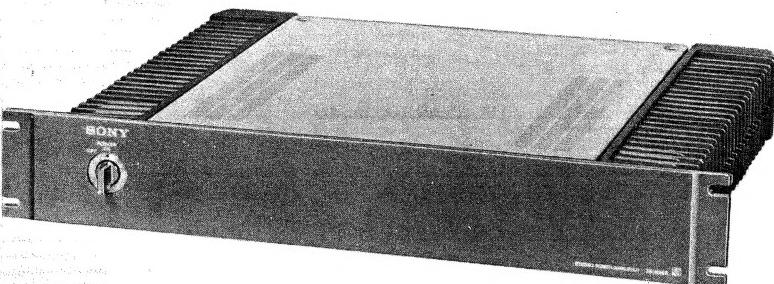


TA-N86B

US Model
Canadian Model
AEP Model
UK Model



STEREO POWER AMPLIFIER



SPECIFICATIONS

GENERAL

| | |
|---------------------|--|
| Power Requirements: | 120 V ac, 60 Hz (US, Canadian model) 220 – 240 V ac, 50/60 Hz (AEP, UK model) |
| Power Consumption: | 210 W (US model) 510 VA (Canadian model) 450 W (AEP, UK model) |
| Dimensions: | Approx. 480 (w) x 80 (h) x 380 (d) mm 18 $\frac{7}{8}$ (w) x 3 $\frac{1}{8}$ (h) x 15 (d) inches Including projecting parts and controls |
| Weight: | Approx. 8.0 kg, 17 lb 10 oz (net) Approx. 8.6 kg, 18 lb 15 oz (in shipping carton) |

POWER AMPLIFIER SECTION

Continuous RMS Power Output:
(US, Canadian model)

Class A and B Operation: with 8 Ω loads, both channels driven, from 20–20,000 Hz, with no more than 0.007% total harmonic distortion

Mono Amp Operation: with 8 Ω loads, from 20–20,000 Hz, with no more than 0.015% THD

| | |
|---------|--|
| Class A | 18 W + 18 W |
| Class B | 80 W + 80 W (8 Ω) 90 W + 90 W (4 Ω) |
| Mono | 180 W |

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND  MARK ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

— Continued on page 2 —

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ !

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET UNE MARQUE  SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DES SUPPLÉMENTS PUBLIÉS PAR SONY.

SONY®
SERVICE MANUAL

(AEP, UK model)
Less than 0.007 % THD, both channels driven simultaneously, 8 Ω
(In mono amp operation: less than 0.015 %, 8 Ω)

| | 20 Hz – 20 kHz |
|---------|------------------------------------|
| Class A | 18W + 18W |
| Class B | 80W + 80W (8 Ω) 60W + 60W (4 Ω) |
| Mono | 120W |

According to DIN 45500

| Class A | 18 W + 18 W |
|---------|-------------|
| Class B | 80 W + 80 W |
| Mono | 120W |

Damping Factor: 70 (1 kHz, 8 Ω)

Harmonic Distortion:

| | 20 Hz–20 kHz | 5 Hz–50 kHz |
|----------------|----------------------------|---------------------------------|
| Rated output | Class A Class B Mono | 0.007 % 0.007 % 0.015 % |
| ½ rated output | Class A Class B Mono | 0.0025 % 0.0035 % 0.008 % |
| 1W output | Class A Class B Mono | 0.001 % 0.003 % 0.008 % |
| | | 0.02 % 0.02 % 0.07 % |
| | | 0.005 % 0.007 % 0.03 % |
| | | 0.006 % 0.007 % 0.025 % |

Intermodulation (IM)

Distortion:
(60 Hz : 7 kHz = 4 : 1)

| Rated output | Class A | 0.004 % |
|----------------|----------------------------|-------------------------------|
| | Class B | 0.004 % |
| | Mono | 0.005 % |
| ½ rated output | Class A Class B Mono | 0.002 % 0.003 % 0.004 % |
| 1W output | Class A Class B Mono | 0.002 % 0.003 % 0.004 % |

Power Bandwidth (IHF): 5 Hz – 45 kHz (Class B, 8 Ω, 0.007 %)
5 Hz – 60 kHz (Class A, 8 Ω, 0.007 %)
5 Hz – 30 kHz (Mono, 8 Ω, 0.015 %)

Frequency Response: DC – 200 kHz $\frac{+0}{-1}$ dB (DIRECT input)
7 Hz – 200 kHz $\frac{+0}{-1}$ dB (C COUPLED input)

S/N Ratio: Greater than 120 dB, short-circuited input

Residual Noise: 25 μV (8 Ω, network A)

Inputs:

| | Gain | | | Impedance | | |
|--|---------|---------|---------|-----------|---------|-------|
| | Class A | Class B | Mono | Class A | Class B | Mono |
| DIRECT | | | | | | |
| C COUPLED (3 Hz cutoff frequency 6 dB/oct slope) | 27.4 dB | 27.4 dB | 33.4 dB | 50 kΩ | 50 kΩ | 50 kΩ |

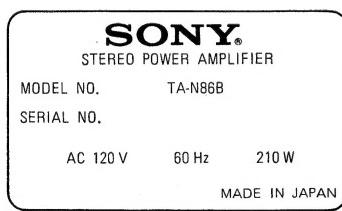
Outputs: SPEAKER terminals
Class B: Accept speakers of 4 – 16 Ω
Class A and Mono amp: Accept speakers of 8 – 16 Ω

0 dB = 0.775 V

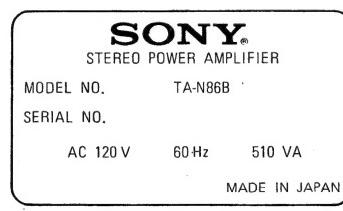
MODEL IDENTIFICATION

Specification Label

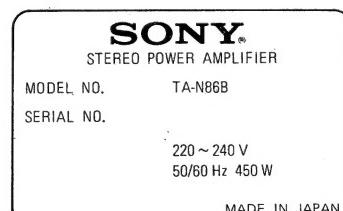
US model



Canadian model



AEP, UK model



SERVICING NOTES

1. REPLACEMENT OF THE TRANSFORMERS IN THE PULSE-LOCKED POWER-SUPPLY CIRCUIT

The lead wire arrangement for each of T601–603 in the inverter circuit are shown in Figs. 1 and 2.

As the repair parts, T603 is formed by an iron core and a coil winding, but T601 and T602 are only iron core. Thus, if the coils are defective, arrange a new transformers as shown in Fig. 1. Note that the lead lengths must be exact. Also wind the coil carefully.

The lead wires ⑤ to ⑧ are as follows:

- lead wire length: ⑦ longer than ⑥

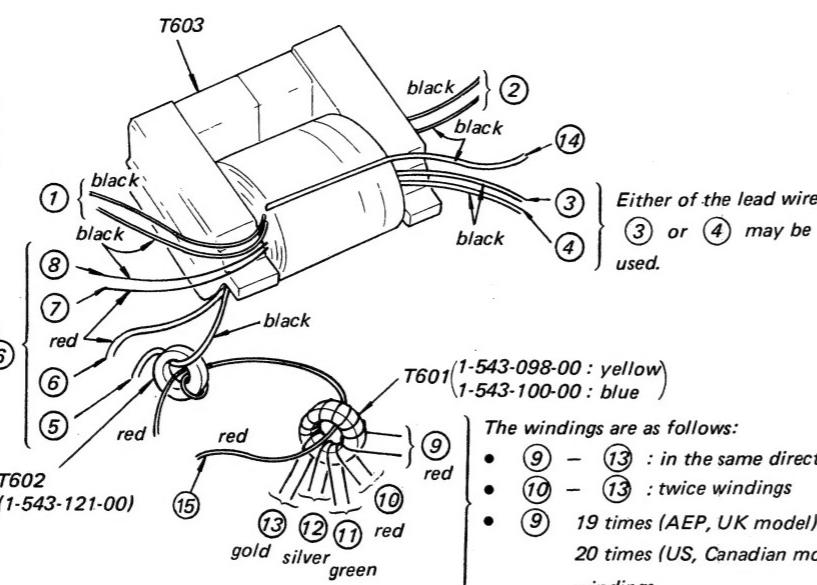


Fig. 1

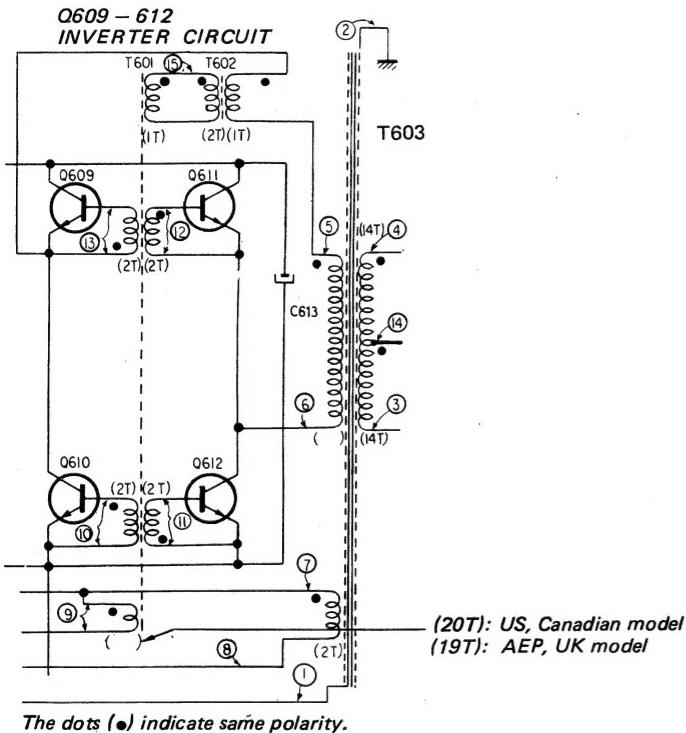


Fig. 2

2. PULSE-LOCKED POWER SUPPLY BOARD REPAIRING

This set has a pulse-locked power-supply circuit which is quite different from a conventional power-supply circuit. The pulse-locked power-supply directly rectifies and smooths the ac input power to produce the higher dc voltages required in the power supply circuit. When servicing this set, note the following.

- 1) To prevent unwanted radiation due to pulse signals in the pulse-locked power-supply circuit, the pulse-locked power-supply board is shielded by the aluminum diecast box.
- 2) The negative circuit of the secondary rectifier in the pulse-locked power-supply circuit is grounded by screws in the aluminum diecast box. When checking the pulse-locked power-supply board out of the box, use a jumper wire as shown.

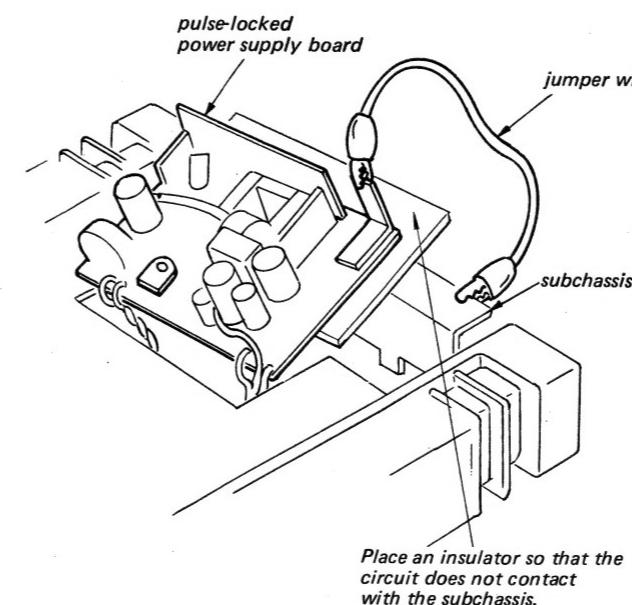
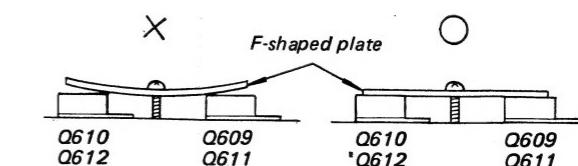


Fig. 4



US, Canadian model

Q609-612

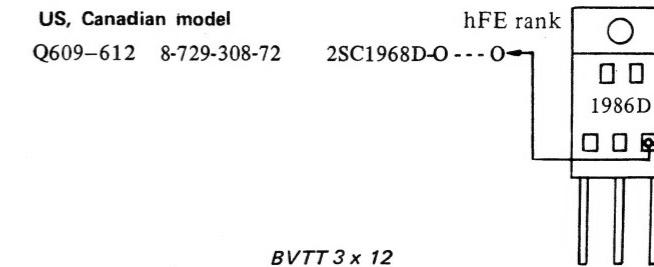
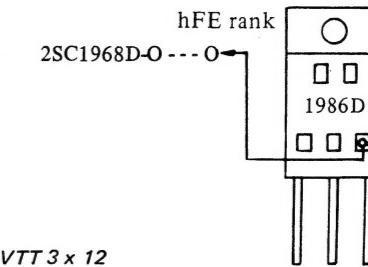


Fig. 4

SECTION 1

OUTLINE

1-1. CIRCUIT DESCRIPTION

[Switching of Class-A and Class-B Amplifiers]

The switching between the class-A and the class-B amplifiers is done by switching the bias voltage of the amplifier.

1. For the class-A amplifier, Q122 and Q123 (Q222 and Q223) are turned off by operating the reed relay RY101 (RY201).

Therefore, the bias voltage for the class-A amplifier is determined by RT103 (RT203). The

B voltage is switched by RY601 to that for the class-A amplifier.

2. For the class-B amplifier, the reed relay RY101 (RY201) do not operate. RT103 (RT203) is short-circuited because Q122 and Q123 (Q222 and Q223) are turned on. As a result, the bias voltage for the class-B amplifier is determined by RT102 (RT202).

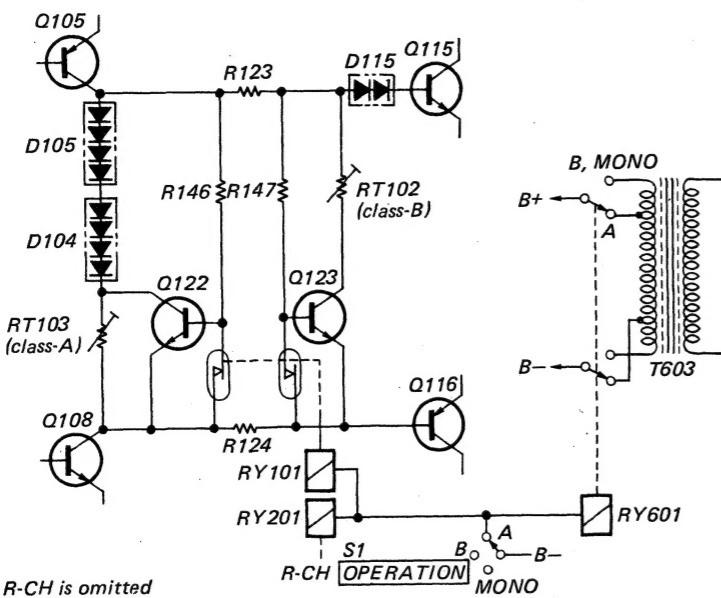


Fig. 1-1.

[MONO Operation]

The left and right channel amplifiers are connected and operated in series (BTL) as shown in Fig. 1-2.

Note that the output forms a balanced push-pull circuit, thus the output power becomes approximately double. The balanced output is obtained by using the original power amplifier input-output phase inversion and inserting a load in series between the each output hot side.

Thus, same but opposite phase signal is supplied to the left and right channel power amplifier inputs simultaneously. As a result, the power applied to the load is doubled.

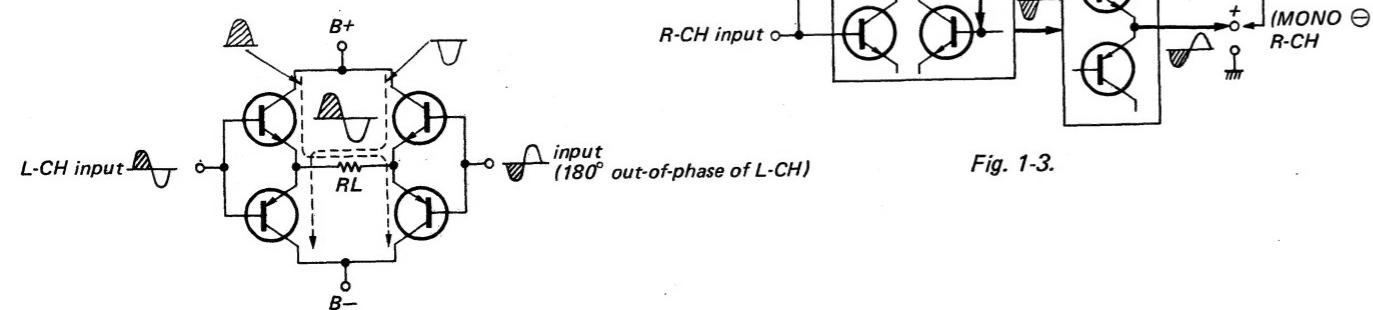
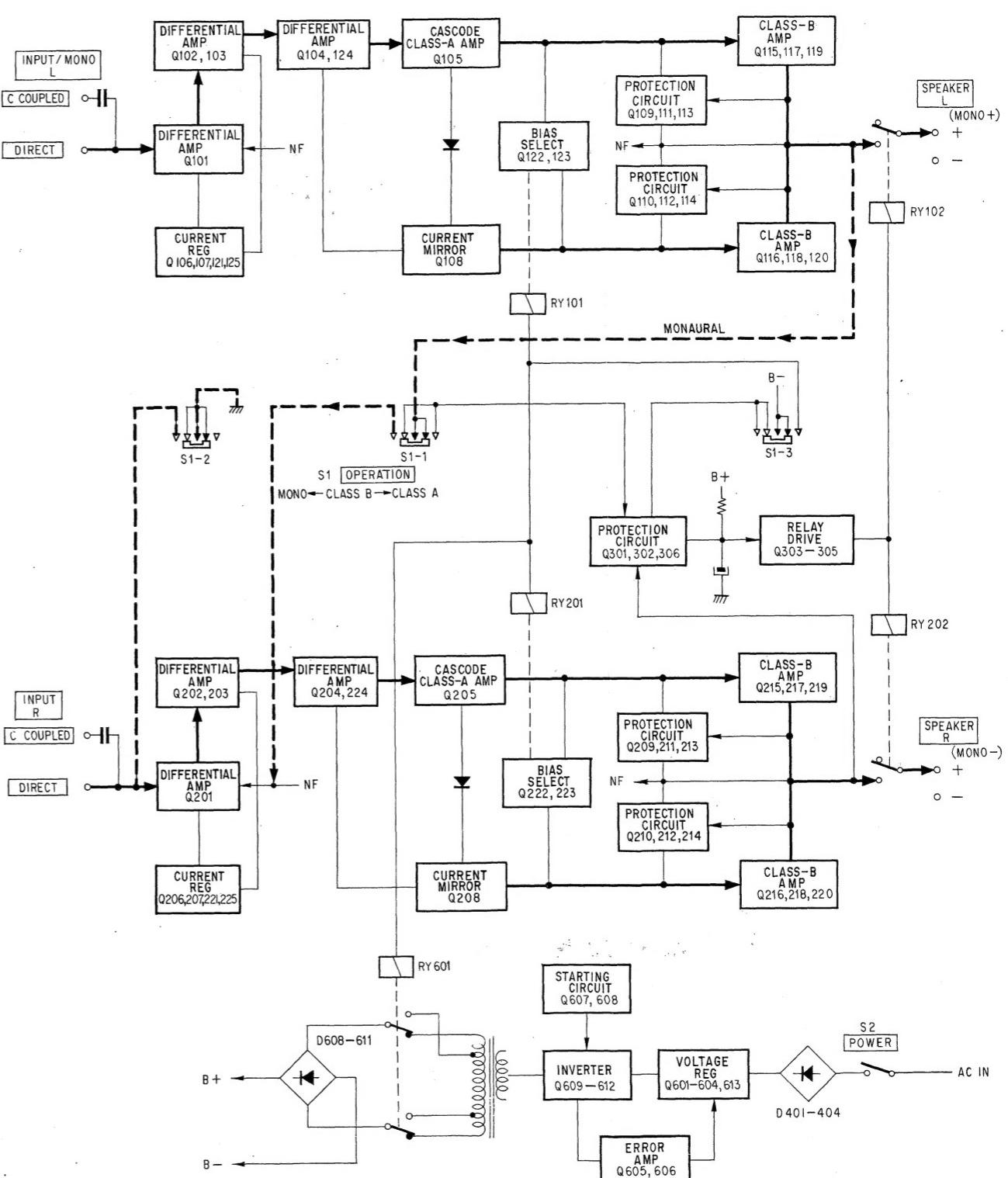


Fig. 1-2.

— 5 —

1-2. BLOCK DIAGRAM

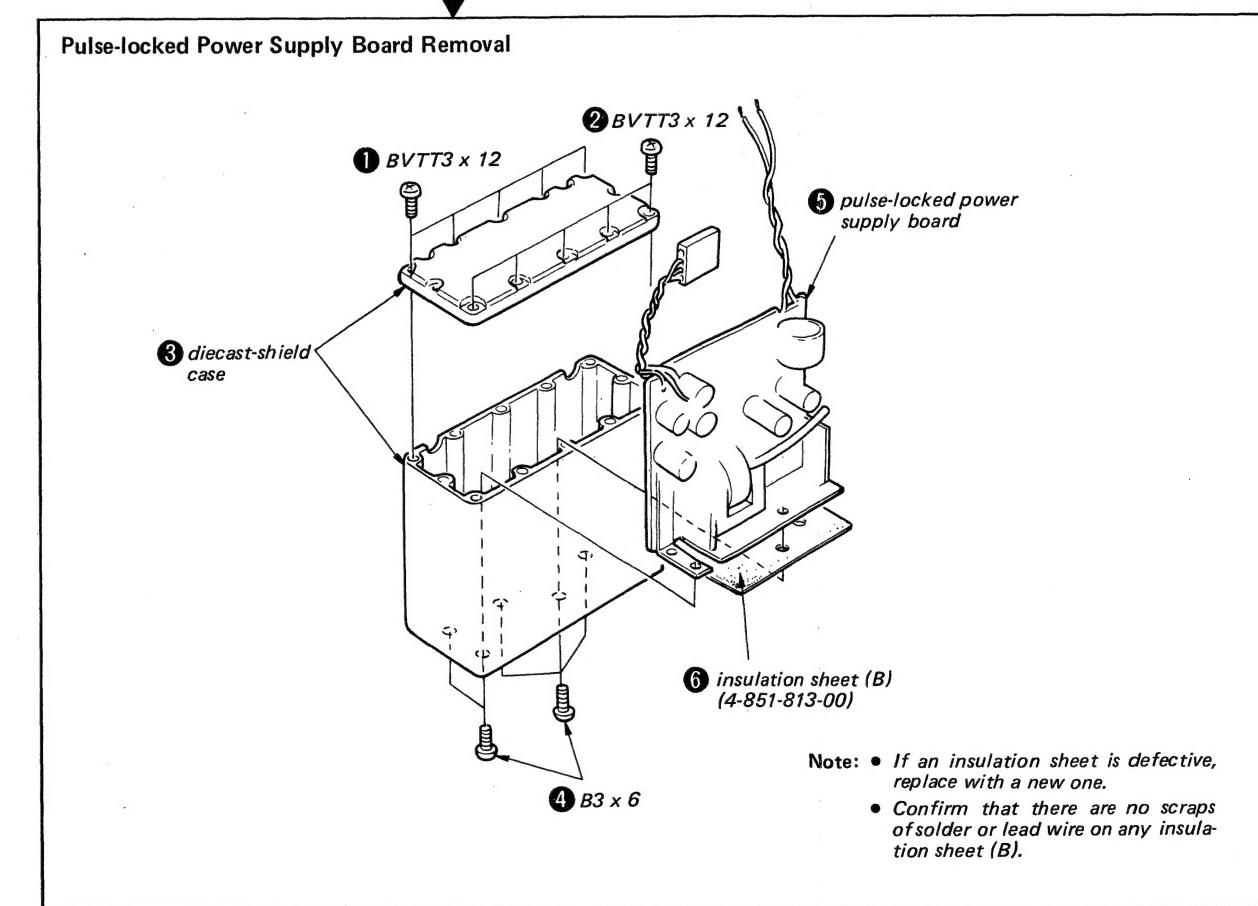
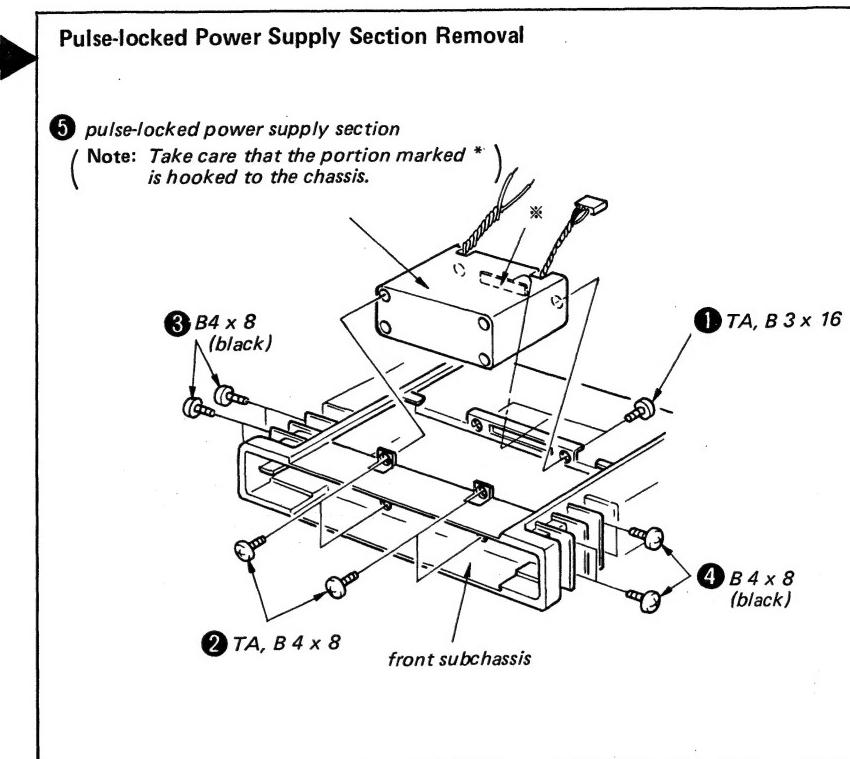
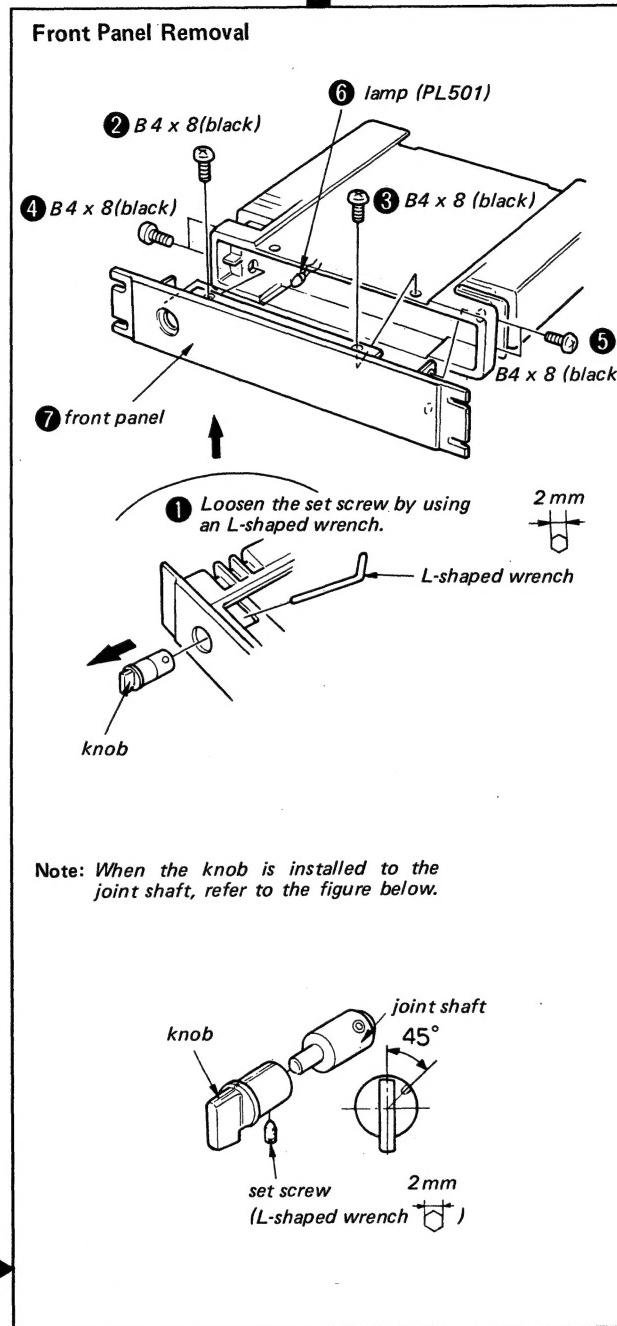
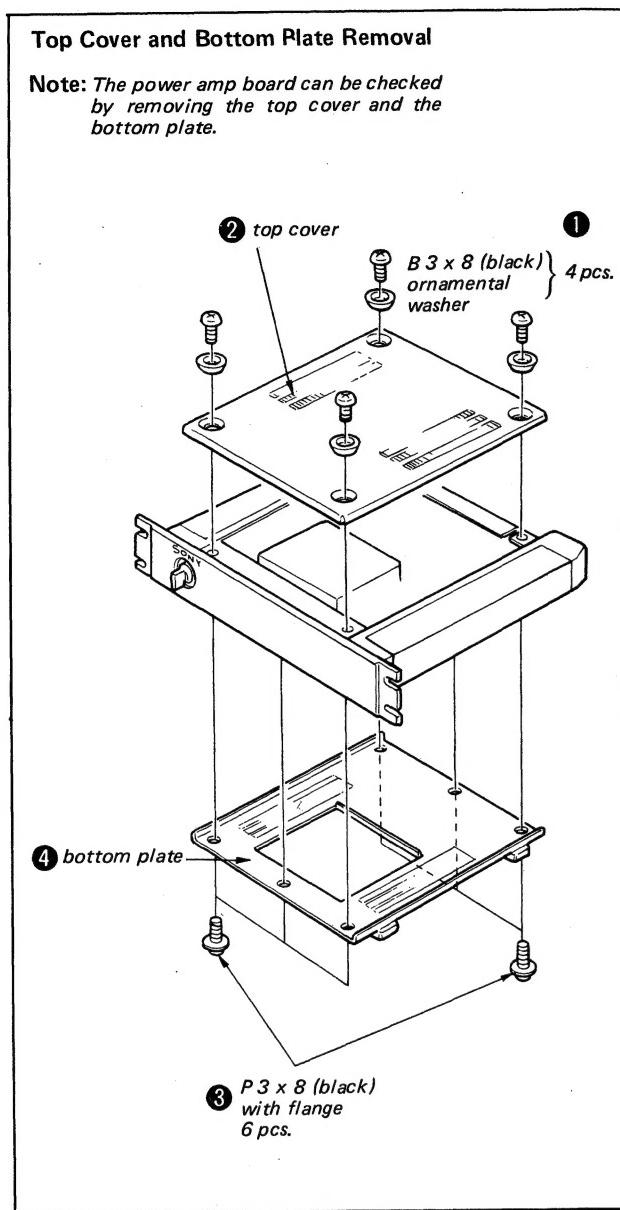


— 6 —

SECTION 2

DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.



SECTION 3

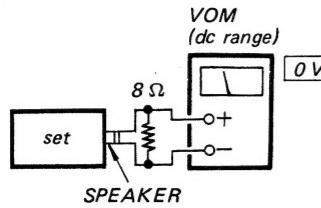
ADJUSTMENTS

- Note:**
1. DC BIAS and DC BALANCE adjustments should be performed about several minutes later after the POWER switch (S10) is turned on.
 2. Repeat DC BIAS and DC BALANCE adjustments two or three times.
 3. After replacing the power transistors, DC BIAS and DC BALANCE adjustments should be performed.

DC Balance Adjustment

Procedure:

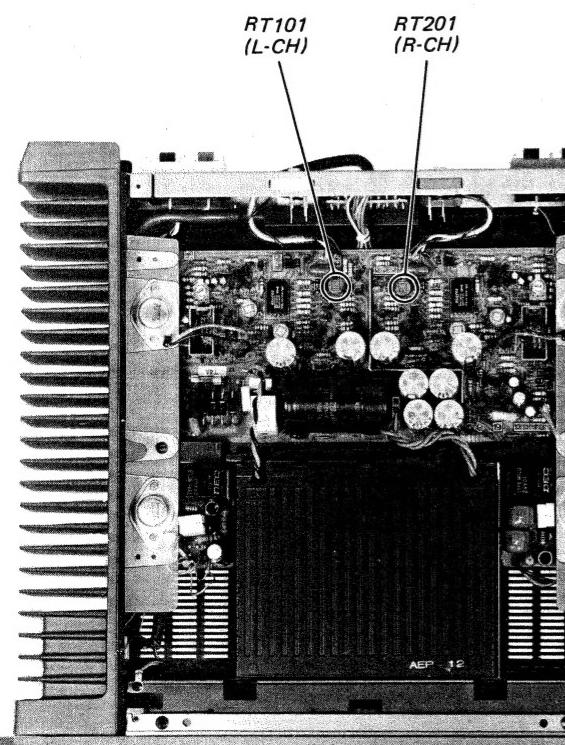
— Power Amp Board —



Adjust RT101 (L-CH) and RT201 (R-CH) for 0 V reading on the VOM.

Adjustment Location

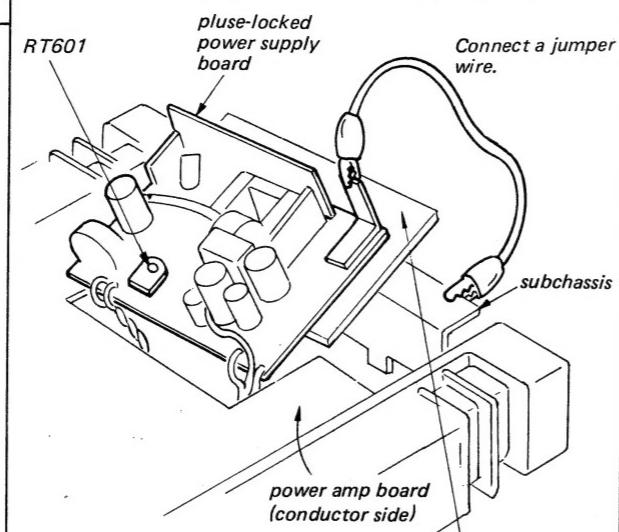
— Power Amp Board —



DC Voltage Adjustment

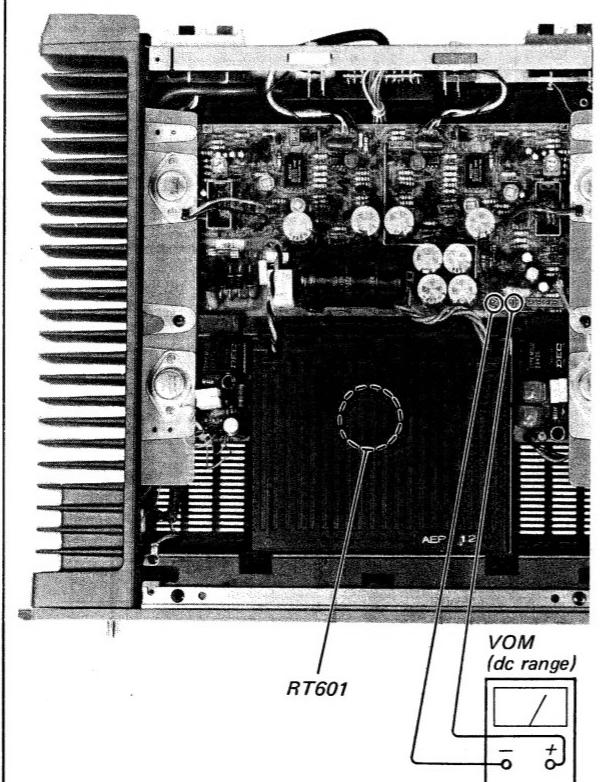
Procedure:

1. Connect a jumper wire.
2. Set the OPERATION switch (S1) to "CLASS B".
3. Adjust RT601 for 90 V reading on the VOM.



Adjustment Location

— Pulse-locked Power Supply Board —



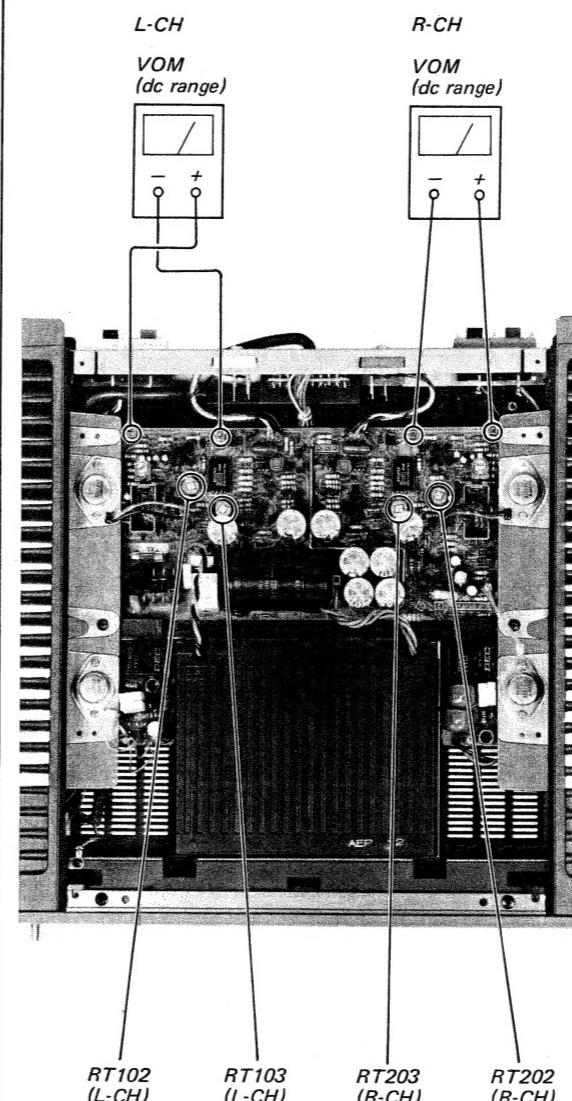
DC Bias Adjustment

Procedure:

1. Set the OPERATION switch (S1) to "CLASS A".
2. Adjust RT103 (L-CH) and RT203 (R-CH) for 350 mV dc on the VOM.
3. Set the OPERATION switch (S1) to "CLASS B".
4. Adjust RT102 (L-CH) and RT202 (R-CH) for 20 mV dc on the VOM.

Adjustment Location

— Power Amp Board —

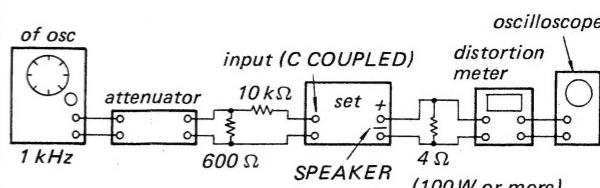


CLASS-B Amp Adjustments

Setting:

OPERATION switch (S1): CLASS-B

Procedure:



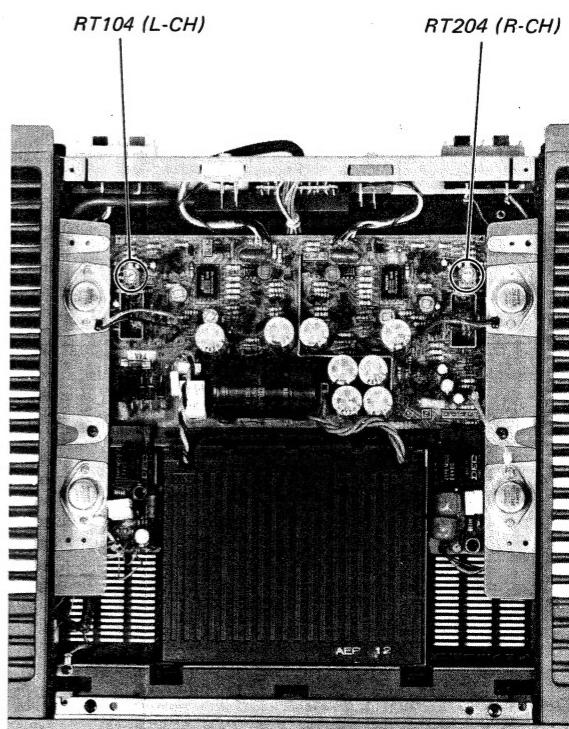
1. Adjust the attenuator for specified reading as shown below.

19 V US, Canadian model
15.5 V AEP, UK model

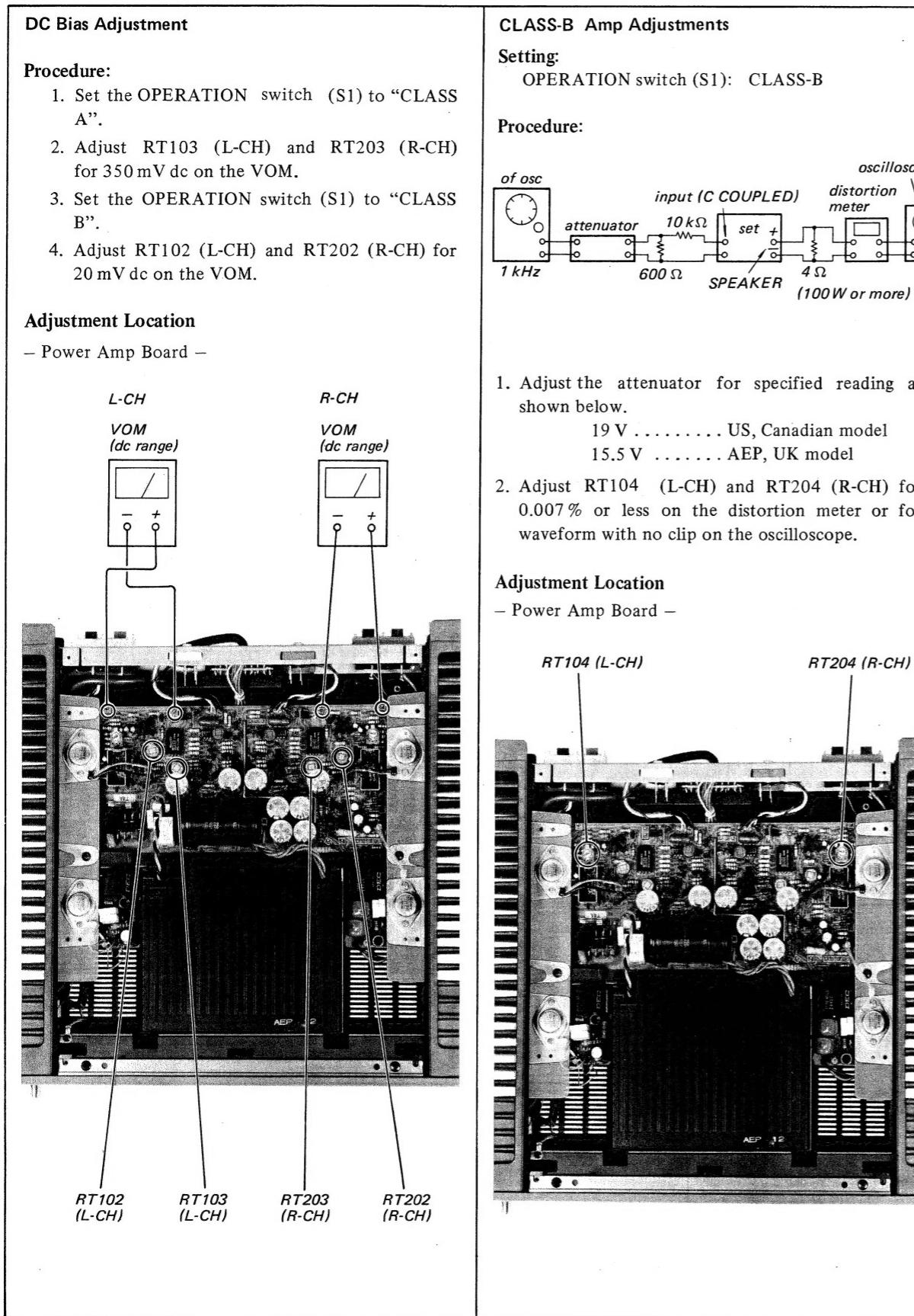
2. Adjust RT104 (L-CH) and RT204 (R-CH) for 0.007% or less on the distortion meter or for waveform with no clip on the oscilloscope.

Adjustment Location

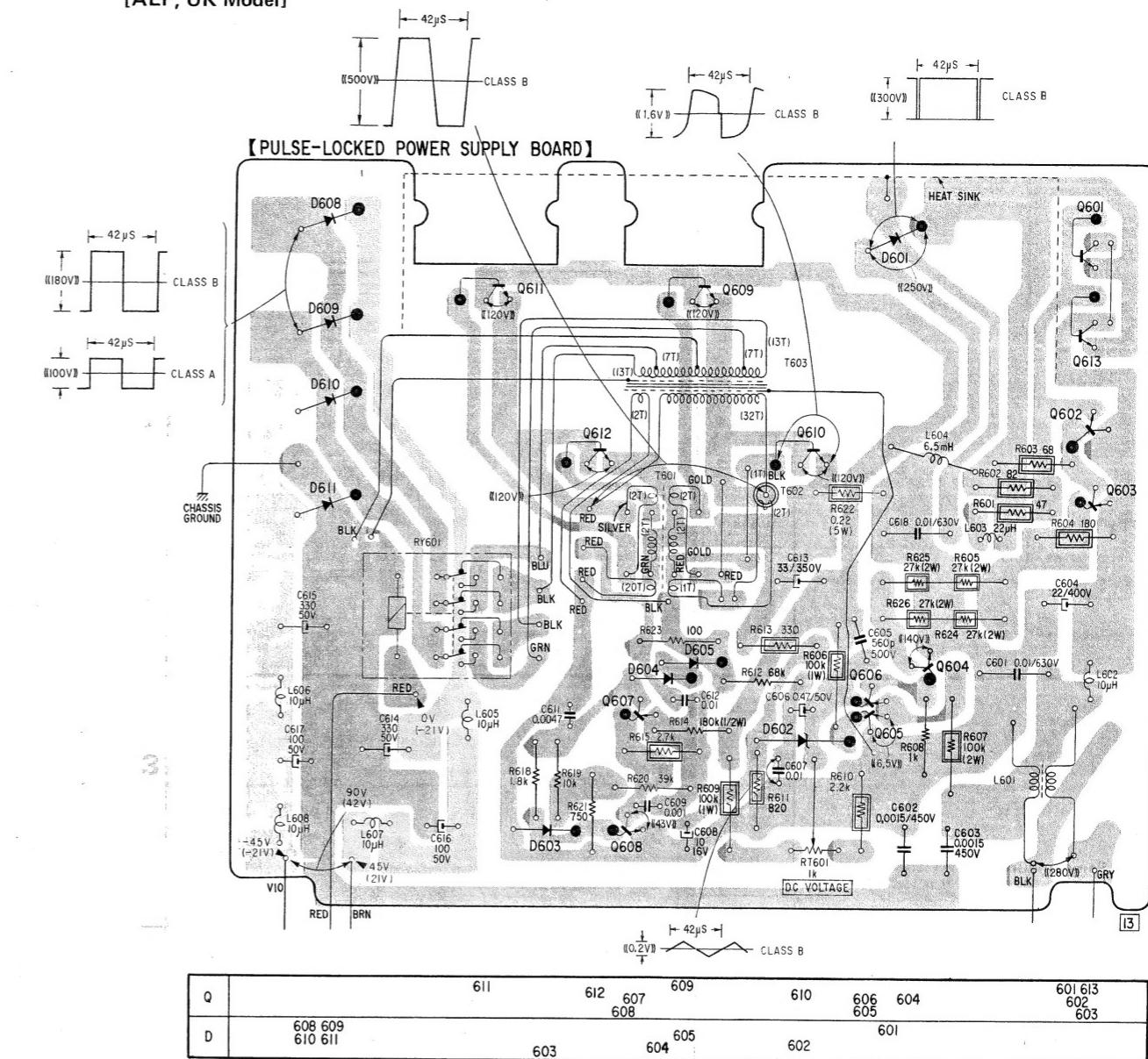
— Power Amp Board —



SECTION 4 DIAGRAMS



**4-1. MOUNTING DIAGRAM — Pulse-locked Power Supply Board —
[AEP, UK Model]**

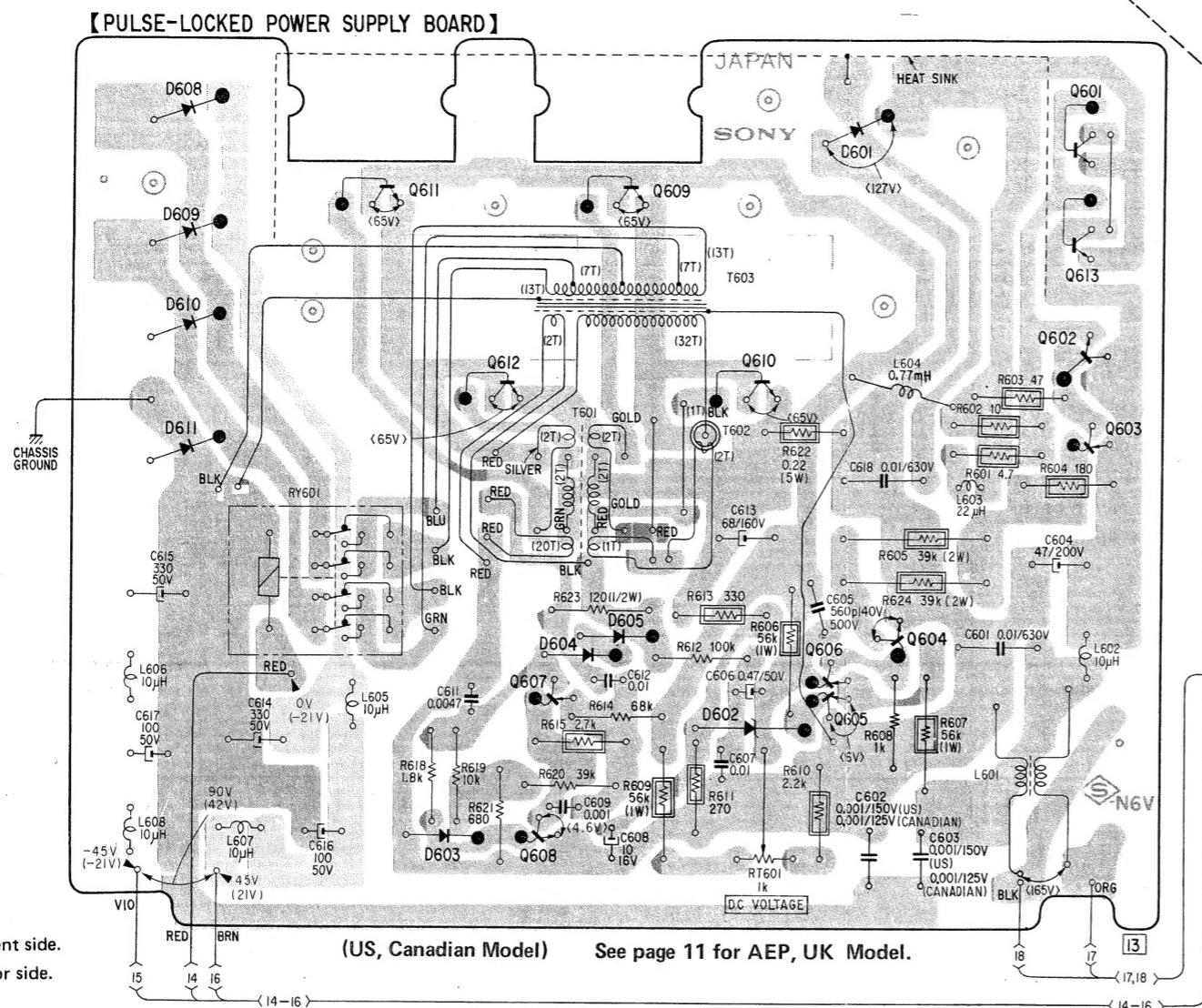


Replacement Semiconductors
see page 18.

Note:

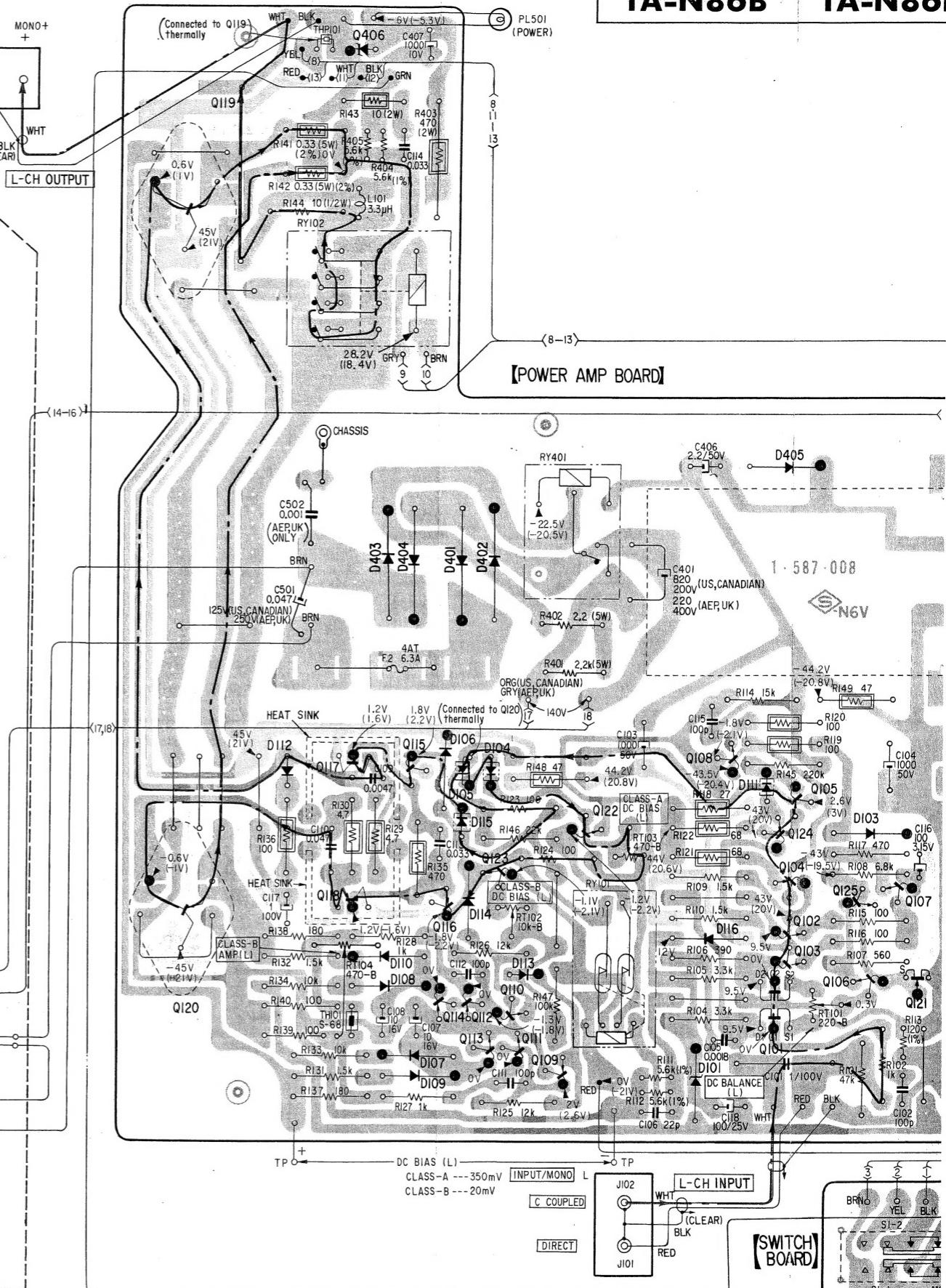
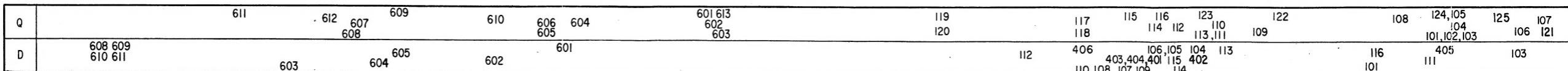
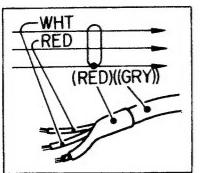
- : parts extracted from the component side.
- : B + pattern
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V)
- Voltage values for pulse-locked power supply circuit
() class A
() with 220 V ac
< > with 120 V ac
- The waveforms are taken under class-B operation with 220 V ac unless otherwise noted.

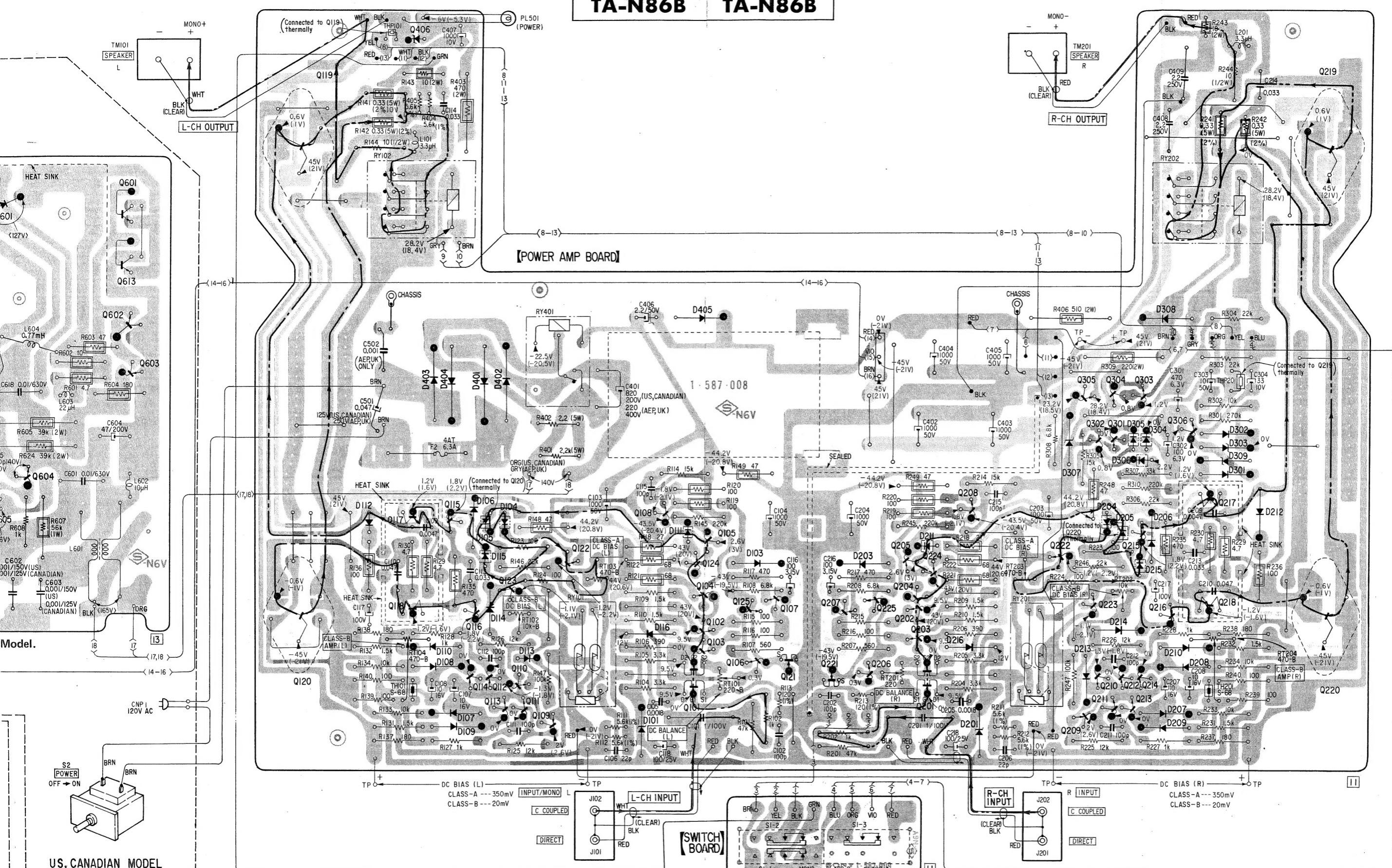
4-2. MOUNTING DIAGRAM



Replacement Semiconductors

- Note:**
 - : parts extracted from the component side.
 - : parts extracted from the conductor side.
 - : B + pattern
 - Signal Path
 - : L-CH
 - : R-CH
 - Readings are taken under no-signal condition
VOM (20 kΩ/V) (OPERATION switch: CLASS)
 - Voltage values for pulse-locked power supply
() class A
(()) with 220 V ac
< > with 120 V ac
 - The waveforms are taken under class-B operation
220 V ac unless otherwise noted.
 - Color code of sleevng over the end of the jacket

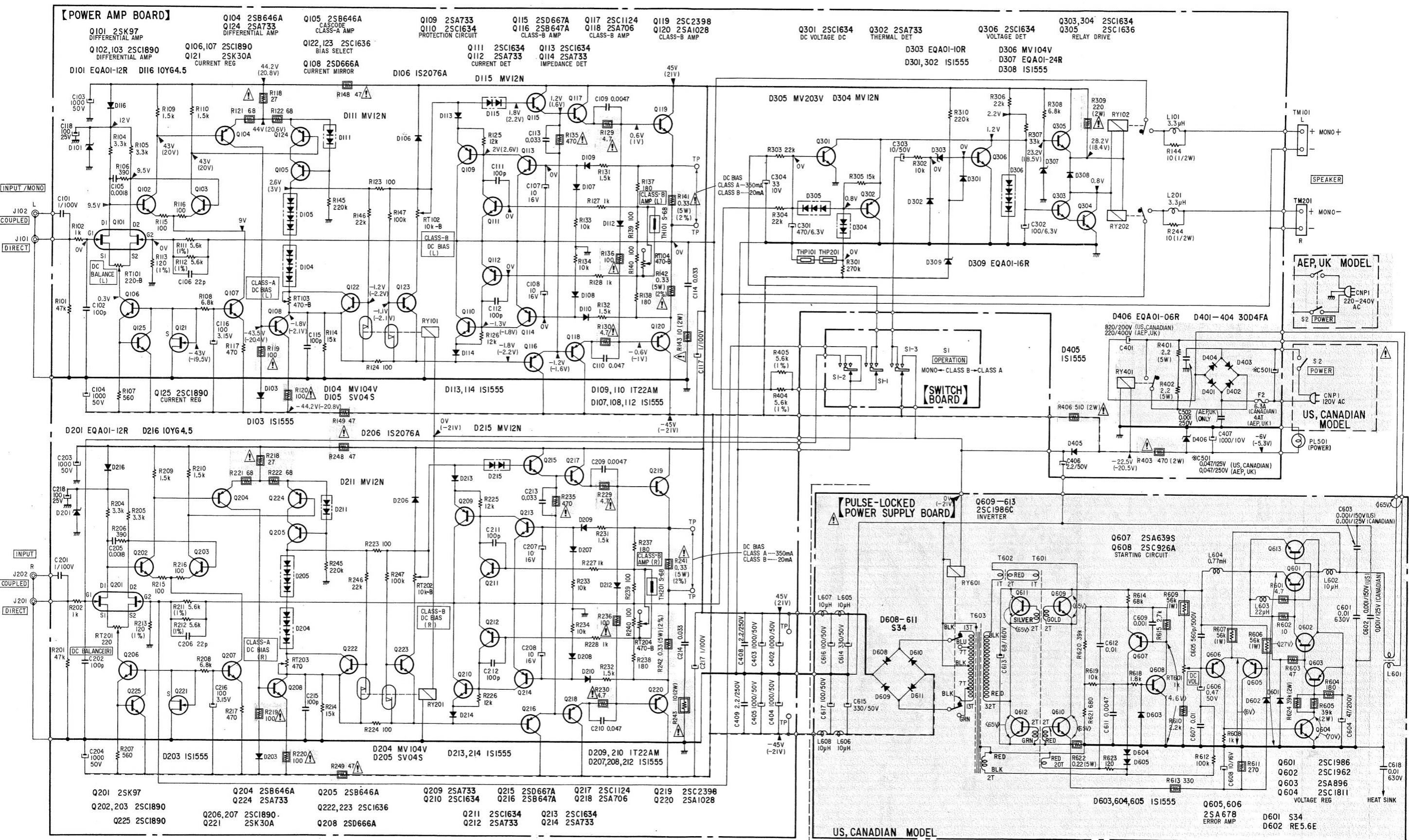


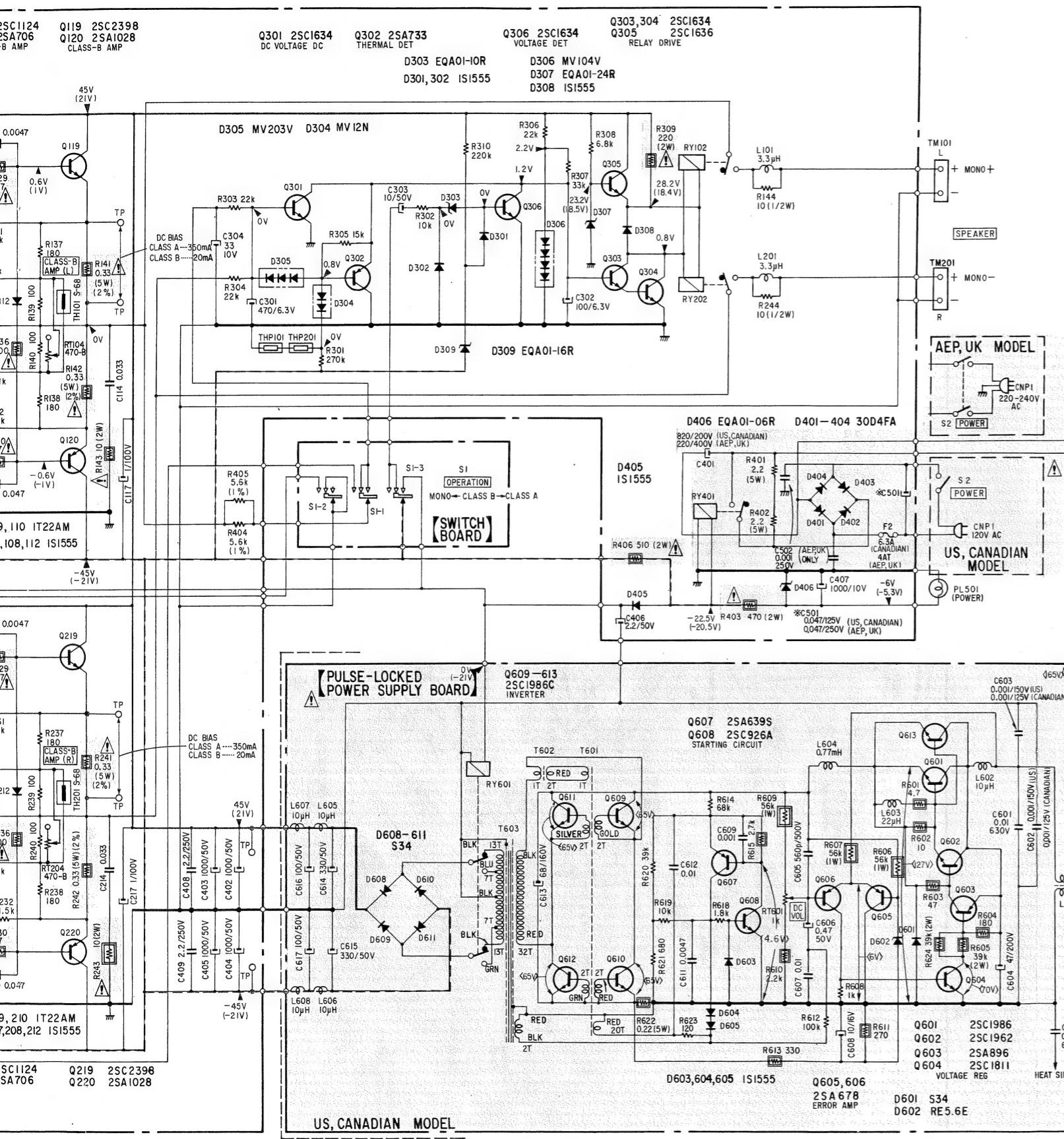


| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----------------------|------------|---------------------------|---------------------------|------------|-----------------|------------|-----|------------|---------------------------|------------|------------|------------|--------------|--------------|--------------------------------|--------------------|--------------------------------------|--------------------------|--------------------|--------------|--------------|------------------------------|--------------|--------------|---|
| 604 | 601 613 602 603 | I19 I20 | I17 I18 | I15 I14 | I16 I12 | I23 I10 | I10 | I22 | I08 | I24, I05 I01, I02, I03 | I04 I13 | I25 I03 | I07 I21 | I207 I21 | I225 I206 | I204, I202, I224 I203, I201 | I208 I211 | I222 I209, I210, I211, I213, I214 | I305, I302 I209, I214 | I304 I213 | I303 I214 | I217 I216 | I218 I208 | I219 I208 | I220 I212 | Q |
| 601 | | I12 | 406 I10, I08, I07, I09 | 403, 404, 401 I15, I14 | 405 I14 | I06, I05 I10 | I04 I13 | I11 | I16 I01 | I11 I13 | I05 I03 | I04 I01 | I03 | I203 I211 | I211 I201 | I204, I205 I214 | I206, I208 I209 | I207 I209, I210, I211, I213, I214 | I205, I204 I213 | I206, I208 I214 | I207 I214 | I208 I209 | I209, I210, I211, I213, I214 | D | | |

TA-N86B

4-3. SCHEMATIC DIAGRAM



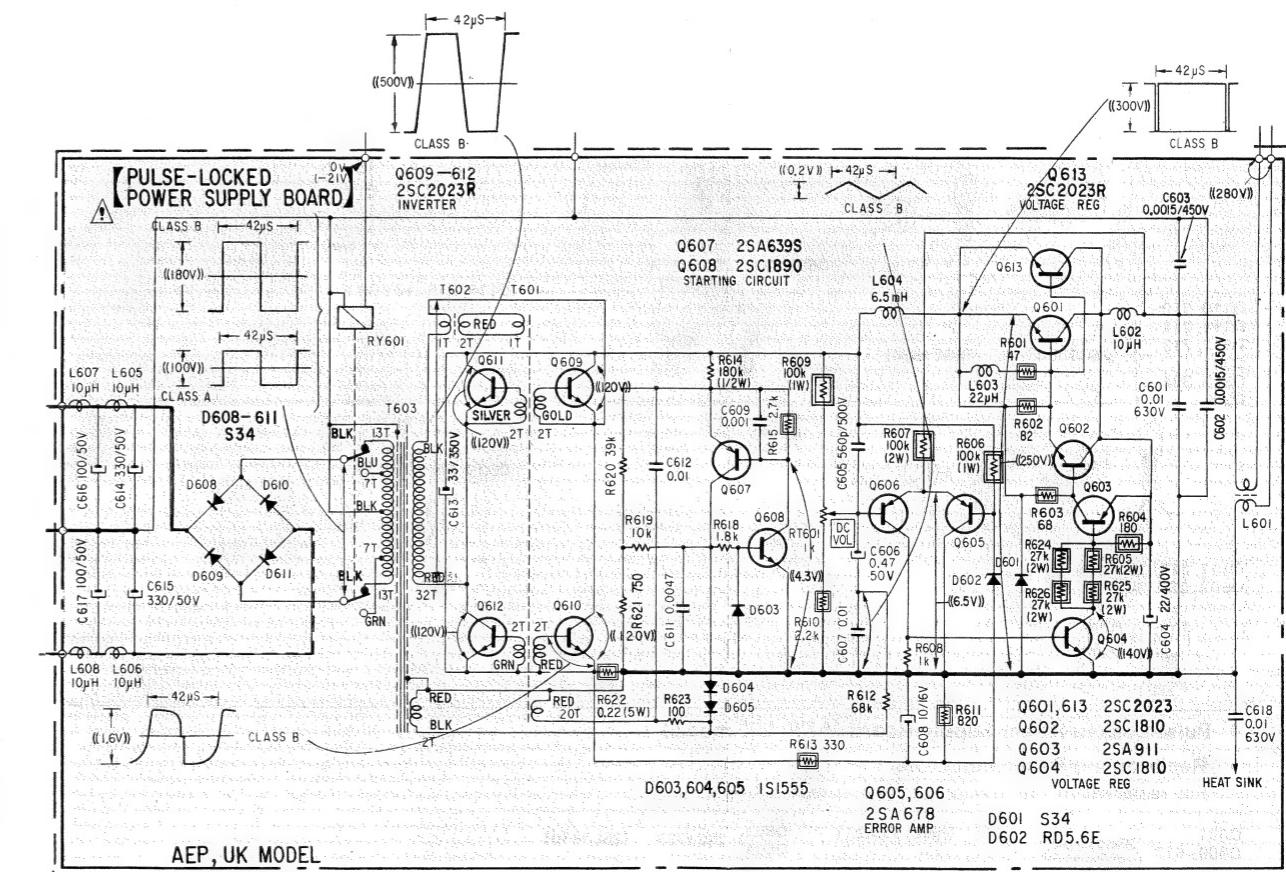


Note

- All capacitors are in μF unless otherwise noted $\text{pF} = \mu\text{mF}$
 50 WV or less are not indicated except for electrolytics.
 - All resistors are in ohms, $\frac{1}{4} \text{ W}$ unless otherwise noted
 $k\Omega : 1000 \Omega$; $M\Omega = 1000 k\Omega$
 - Voltages are dc with respect to ground unless otherwise noted.
 - All adjustable resistors have characteristic curve B, unless otherwise noted.
 -  : nonflammable resistor.
 - 1% indicates component tolerance.
 -  : panel designation.
 -  : adjustment for repair.
 - Readings are taken under no-signal conditions with VOM (20 $k\Omega/\text{V}$) (OPERATION switch: CLASS B)
 - Voltage values for pulse-locked power supply circuits
 () class A
 (()) with 220 V ac
 < > with 120 V ac
 - The waveforms are taken under class-B operation with 220 V ac unless otherwise noted.
 - _____ : B+ bus.
 - _____ : B- bus.
 - Switch

Note: The components identified by shading and mark
⚠ are critical for safety. Replace only with
part number specified.

Note: Les composants identifiés par un trame et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

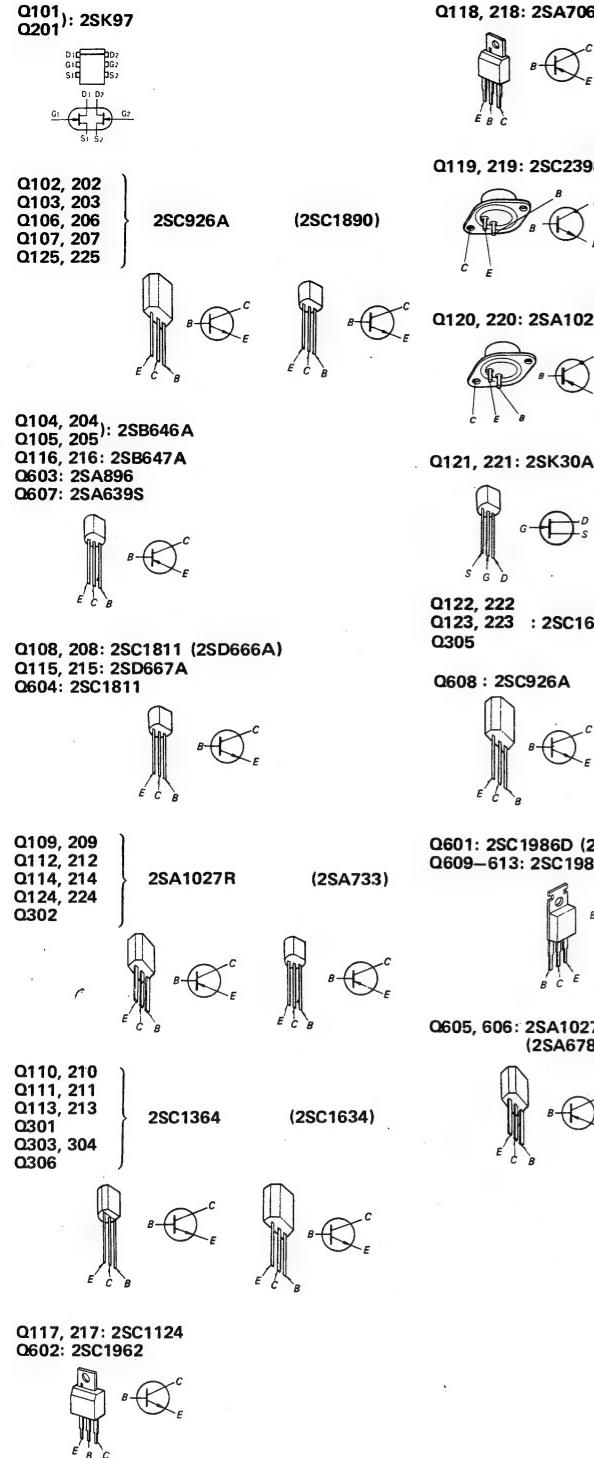


SECTION 5

EXPLODED VIEWS

- **Replacement Semiconductors**

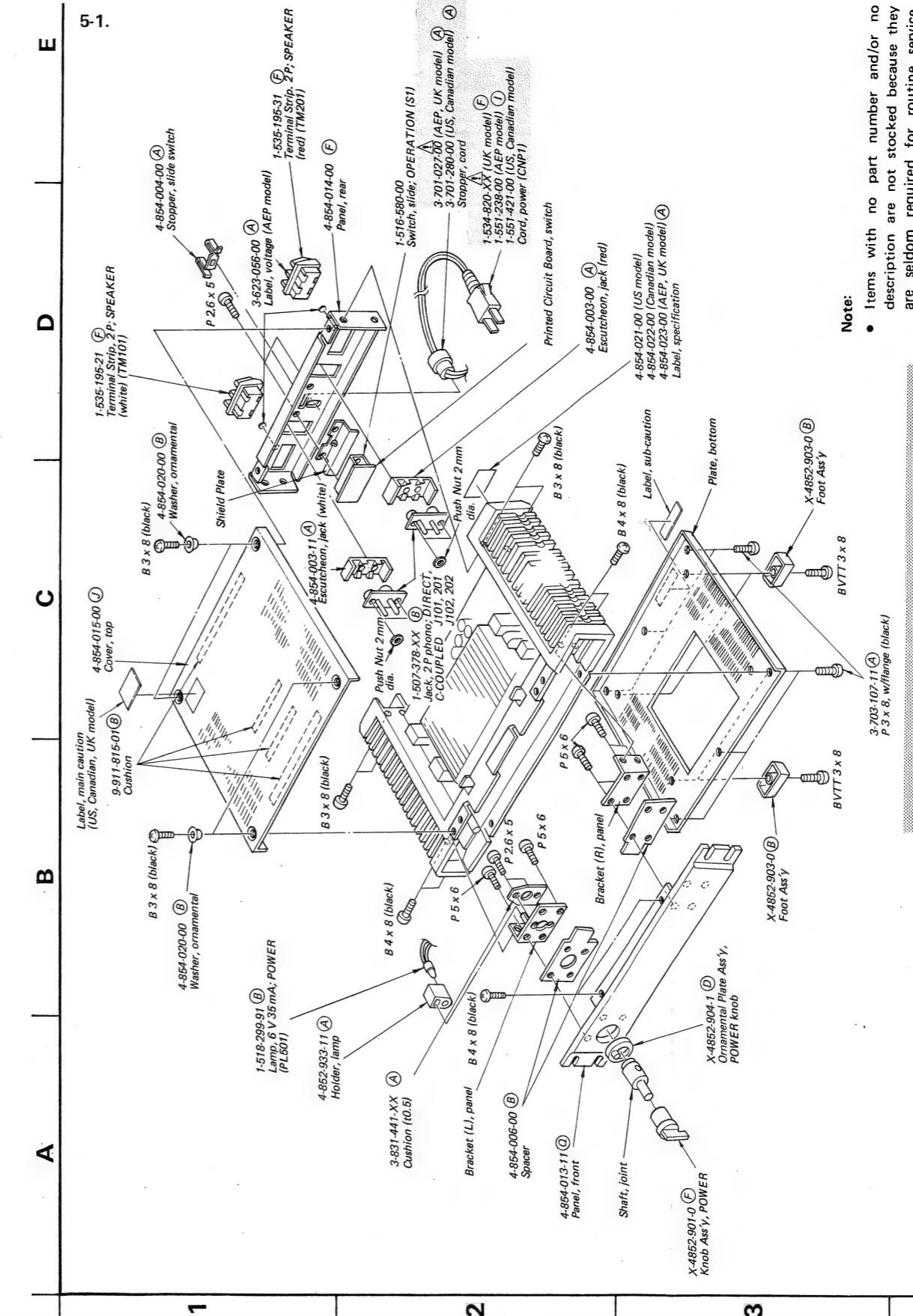
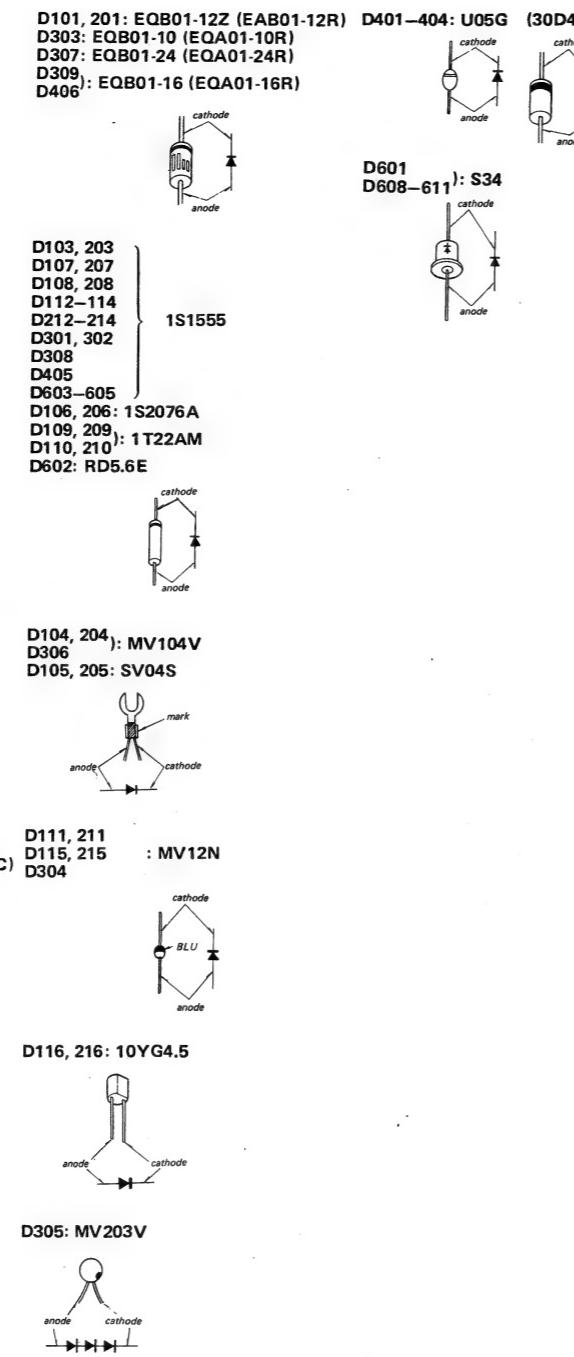
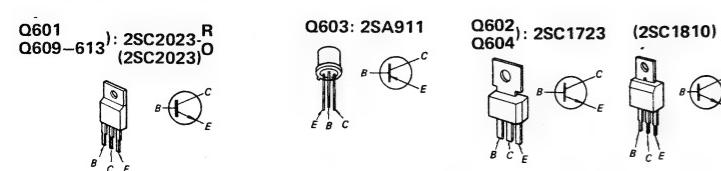
For replacement, use semiconductors except in (.



- Pulse-Locked Power Supply Board (AEP, UK model)

- **Replacement Semiconductors**

For replacement, use semiconductors except in (



Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

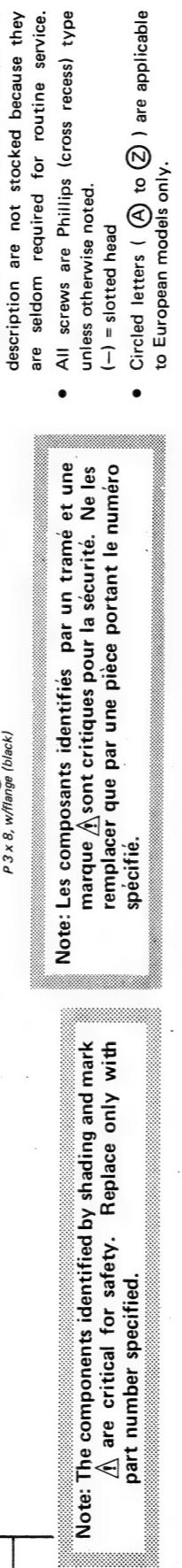
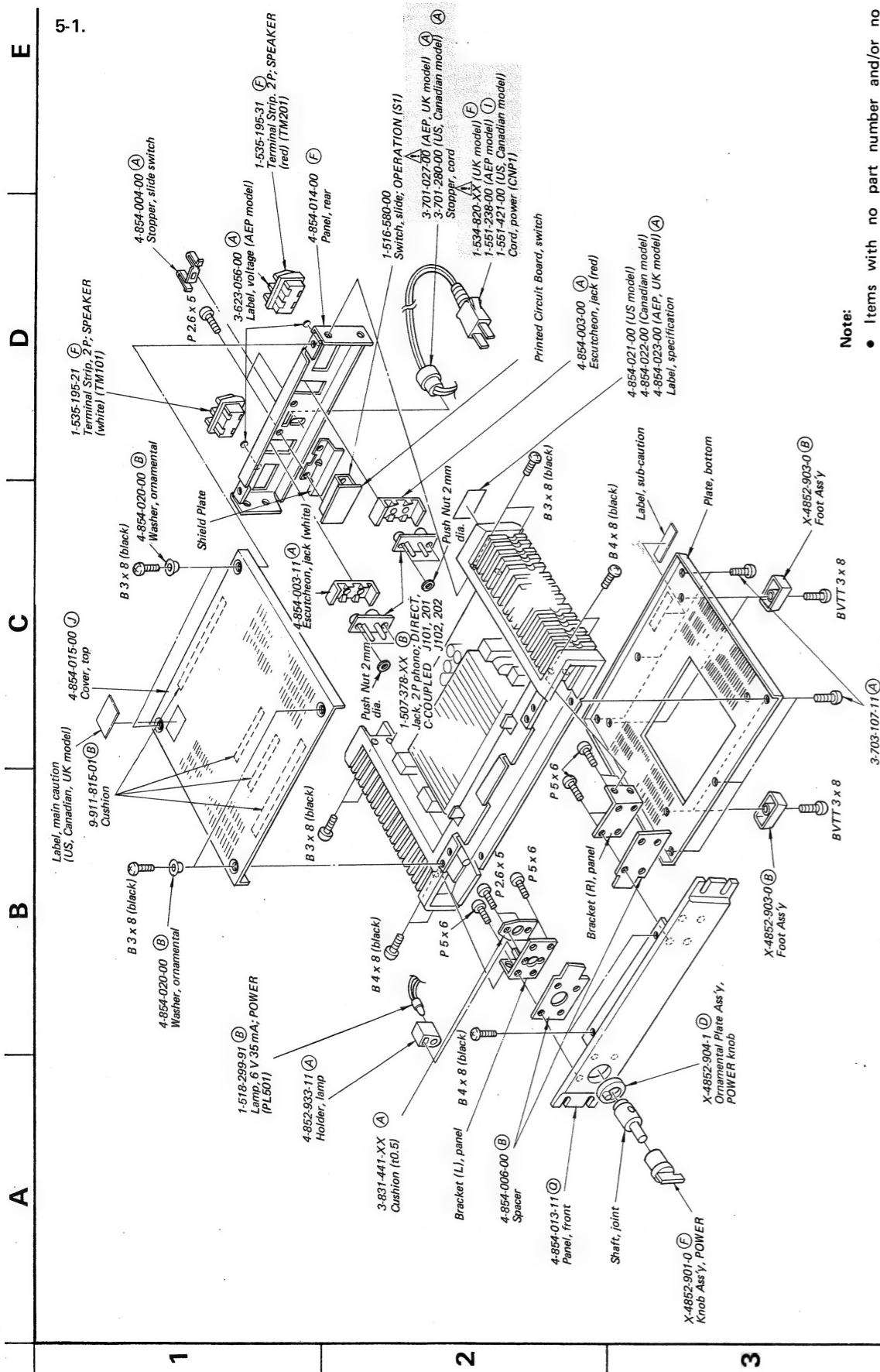
Note: Les composants identifiés par un trame et une marque sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Circled letters (Ⓐ to Ⓛ) are applicable
- Description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
(-) = slotted head

5-2.
P 3 x 16

4,848.640.00 (4)

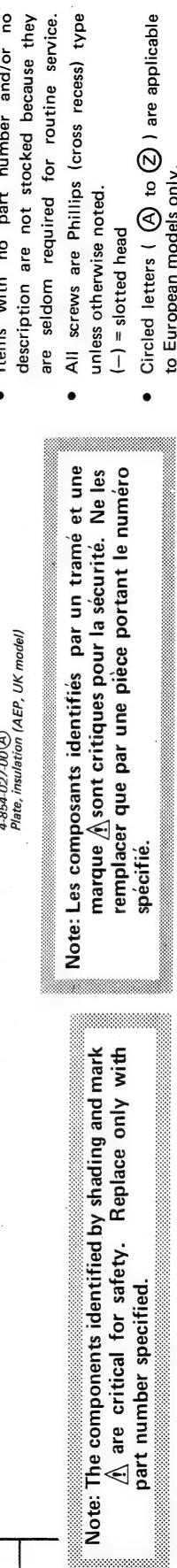
SECTION 5
EXPLODED VIEWS



Note: The components identified by shading and mark \triangle are critical for safety. Replace only with part number specified.

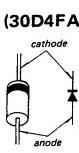
Note: Les composants identifiés par un trame et une marque \triangle sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- Circled letters (Ⓐ to Ⓛ) are applicable to European models only.



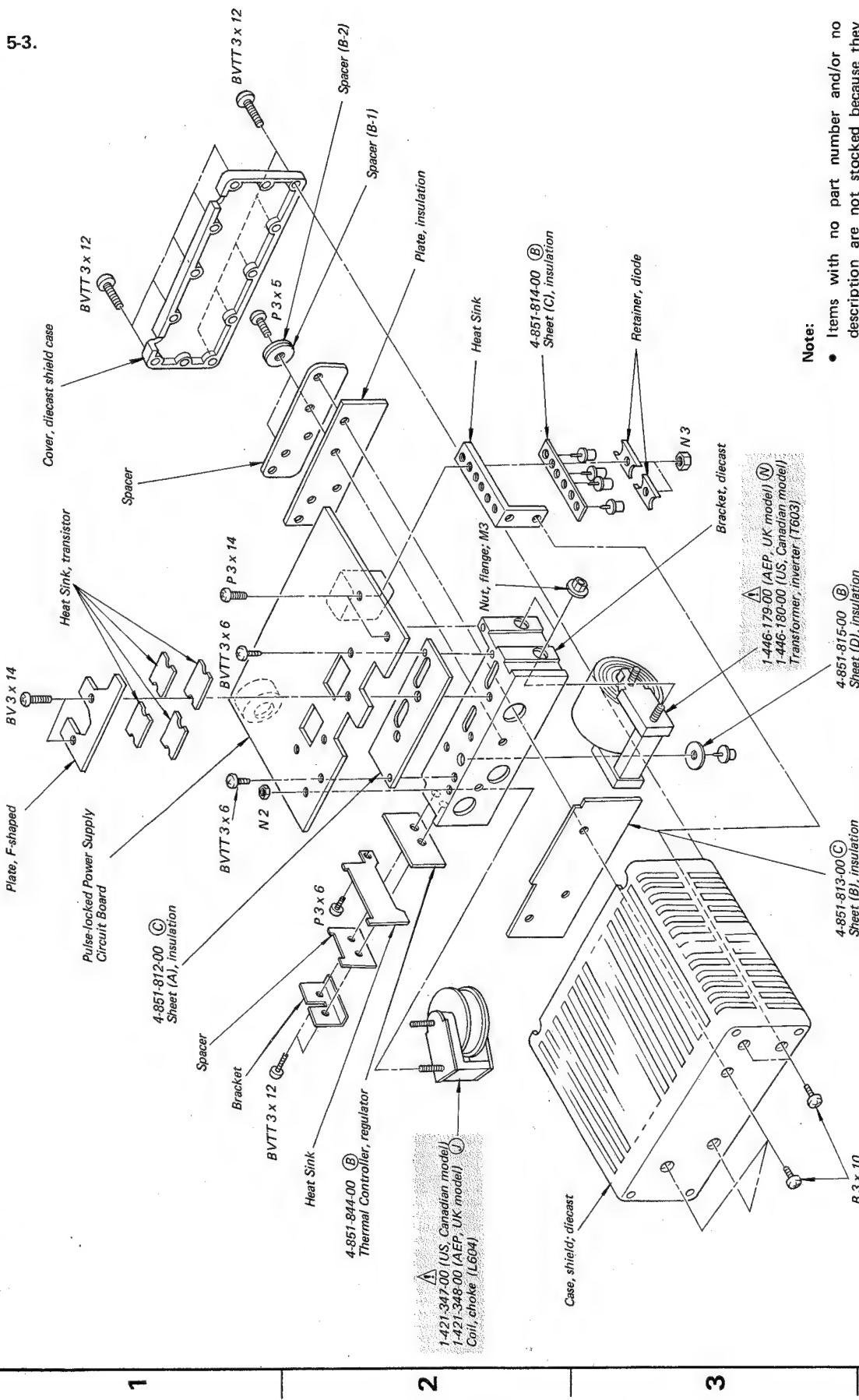
Note: The components identified by shading and mark \triangle are critical for safety. Replace only with part number specified.

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- Circled letters (Ⓐ to Ⓛ) are applicable to European models only.



E
D
C
B
A

5-3.



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
(-) = slotted head
- Circled letters (A) to (Z) are applicable to European models only.

Note: Les composants identifiés par un trame et une marque \triangle sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: The components identified by shading and mark \triangle are critical for safety. Replace only with part number specified.

SECTION 6

ELECTRICAL PARTS LIST

Note: Circled letters (A to Z) are applicable to European models only.

| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u> |
|-----------------------|-----------------|-------------------------------|
| SEMICONDUCTORS | | |
| Transistors | | |
| Q101, 201 | 8-765-342-10 | (F) 2SK97 |
| ⇒ Q102, 202 | 8-720-950-03 | (C) 2SC926A |
| ⇒ Q103, 203 | | |
| Q104, 204 | 8-729-304-62 | (B) 2SB646A |
| Q105, 205 | | |
| ⇒ Q106, 206 | 8-720-950-03 | (C) 2SC926A |
| ⇒ Q107, 207 | | |
| ⇒ Q108, 208 | 8-765-012-20 | (C) 2SC1811 |
| ⇒ Q109, 209 | 8-729-612-77 | (B) 2SA1027R |
| ⇒ Q110, 210 | 8-729-663-47 | (C) 2SC1364 |
| ⇒ Q111, 211 | | |
| ⇒ Q112, 212 | 8-729-612-77 | (B) 2SA1027R |
| ⇒ Q113, 213 | 8-729-663-47 | (C) 2SC1364 |
| ⇒ Q114, 214 | 8-729-612-77 | (B) 2SA1027R |
| Q115, 215 | 8-729-306-72 | (B) 2SD667A |
| Q116, 216 | 8-729-300-72 | (B) 2SB647A |
| Q117, 217 | 8-725-412-00 | (C) 2SC1124 |
| Q118, 218 | 8-727-632-00 | (C) 2SA706 |
| Q119, 219 | 8-765-471-20 | (I) 2SC2398 |
| Q120, 220 | 8-765-481-20 | (K) 2SA1028 |
| Q121, 221 | 8-729-203-04 | (B) 2SK30A |
| Q122, 222 | | |
| Q123, 223 | 8-761-622-00 | (B) 2SC1636 |
| ⇒ Q124, 224 | 8-729-612-77 | (B) 2SA1027R |
| ⇒ Q125, 225 | 8-720-950-03 | (C) 2SC926A |
| ⇒ Q301 | 8-729-663-47 | (C) 2SC1364 |
| ⇒ Q302 | 8-729-612-77 | (B) 2SA1027R |
| ⇒ Q303, 304 | 8-729-663-47 | (C) 2SC1364 |
| Q305 | 8-761-622-00 | (B) 2SC1636 |
| ⇒ Q306 | 8-729-663-47 | (C) 2SC1364 |
| ⇒ Q601 | 8-729-302-31 | (D) 2SC2023-R (AEP, UK model) |
| ⇒ Q601 | 8-729-302-32 | (D) 2SC2023-O (AEP, UK model) |
| ⇒ Q601 | 8-729-308-72 | 2SC1986D (US, Canadian model) |
| ⇒ Q602 | 8-729-372-30 | (C) 2SC1723 (AEP, UK model) |
| Q602 | 8-765-170-01 | 2SC1962 (US, Canadian model) |
| Q603 | 8-765-082-20 | 2SA896 (US, Canadian model) |

Note: Circled letters (A) to (Z) are applicable to European models only.

| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u> |
|---|-----------------|--|
| Thermistors | | |
| TH101, 201 | 1-800-193-00 | (A) Thermistor, S-68 |
| THP101, | 2011-800-427-00 | (B) Thermistor, positive |
| COILS | | |
| L601 | A1-421-259-00 | Line filter (US, Canadian model) |
| L601 | A1-421-349-00 | (F) Line filter (AEP, UK model) |
| L602 | A1-421-329-00 | (B) 10 μ H, choke |
| L603 | A1-407-161-XX | (A) 22 μ H, microinductor |
| L604 | A1-421-347-00 | 0.77 mH, choke (US, Canadian model) |
| L604 | A1-421-348-00 | (J) 6.5 mH, choke (AEP, UK model) |
| L605-608 | A1-421-329-00 | (B) 10 μ H, choke |
| TRANSFORMERS | | |
| T601 | A1-543-098-00 | Core (US, Canadian model) |
| T601 | A1-543-100-00 | (B) Core (AEP, UK model) |
| T602 | A1-543-121-00 | (B) Core |
| T603 | A1-446-179-00 | (M) Inverter (AEP, UK model) |
| T603 | A1-446-180-00 | Inverter (US, Canadian model) |
| CAPACITORS | | |
| All capacitors are in μ F and electrolytic unless otherwise noted. 50 WV or less are not indicated except for electrolytics. p : $\mu\mu$ F, elect : electrolytic | | |
| C101, 201 | 1-130-083-00 | (C) 1 100V polyethylene |
| C102, 202 | 1-102-975-00 | (A) 100 p ceramic |
| C103, 203 | 1-123-061-00 | (C) 1000 50V |
| C104, 204 | | |
| C105, 205 | 1-108-561-00 | (A) 0.0018 mylar |
| C106, 206 | 1-107-069-00 | (A) 22 p mica |
| C107, 207 | 1-121-651-00 | (A) 10 16V |
| C108, 208 | | |
| C109, 209 | 1-108-234-00 | (A) 0.0047 mylar |
| C110, 210 | 1-108-246-00 | (A) 0.047 mylar |
| C111, 211 | 1-102-975-00 | (A) 100 p ceramic |
| C112, 212 | | |
| C113, 213 | 1-108-244-00 | (A) 0.033 mylar |
| C114, 214 | | |

| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u> |
|-----------------|-----------------|--|
| C115, 215 | 1-107-085-00 | (A) 100 p mica |
| C116, 216 | 1-131-177-00 | (C) 100 3.15 V tantalum |
| C117, 217 | 1-123-249-00 | (A) 1 100 V |
| C118, 218 | 1-121-417-00 | (B) 100 25 V |
| C301 | 1-121-424-00 | (B) 470 6.3 V |
| C302 | 1-121-414-00 | (A) 100 6.3 V |
| C303 | 1-121-738-00 | (A) 10 50 V |
| C304 | 1-121-402-00 | (A) 33 10 V |
| C401 | A1-123-407-00 | (I) 220 400 V (AEP, UK model) |
| C401 | A1-123-408-00 | 820 200 V (US, Canadian model) |
| C402-405 | 1-123-061-00 | (C) 1000 50 V |
| C406 | 1-121-450-00 | (A) 2.2 50 V |
| C407 | 1-121-736-00 | (B) 1000 10 V |
| C408, 409 | 1-108-972-00 | (G) 2.2 250 V mylar |
| C501 | A1-108-749-00 | 0.047 125 V mylar (US model) |
| C501 | A1-130-159-00 | (C) 0.047 250 V film (AEP, UK model) |
| C501 | A1-130-197-00 | 0.047 125 V polyethylene (Canadian model) |
| C502 | A1-102-222-00 | (B) 0.001 250 V ceramic (AEP, UK model) |
| C601 | A1-130-141-00 | (A) 0.01 630 V polyethylene |
| C602, 603 | A1-115-149-00 | (C) 0.0015 450 V paper (AEP, UK model) |
| C602, 603 | A1-161-502-00 | 0.001 150 V ceramic (US model) |
| C602, 603 | A1-161-516-00 | 0.001 125 V ceramic (Canadian model) |
| C604 | A1-123-401-00 | 47 200 V (US, Canadian model) |
| C604 | A1-123-402-00 | (C) 22 400 V (AEP, UK model) |
| C605 | A1-161-438-00 | (A) 560 p 500 V ceramic |
| C606 | A1-121-726-00 | (A) 0.47 50 V |
| C607 | A1-108-239-00 | (A) 0.01 mylar |
| C608 | A1-121-651-00 | (A) 10 16 V |
| C609 | A1-108-227-00 | (A) 0.001 mylar |
| C611 | A1-108-234-00 | (A) 0.0047 mylar |
| C612 | A1-108-239-51 | (A) 0.01 mylar |
| C613 | A1-123-277-00 | 68 160 V (US, Canadian model) |

Note: The components identified by shading and mark are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: Circled letters (A) to (Z) are applicable to European models only.

| Ref. No. | Part No. | Description |
|-----------|---------------|------------------------------|
| C613 | A1-123-280-00 | (C) 33 350 V (AEP, UK model) |
| C614, 615 | A1-121-656-00 | (B) 330 50 V |
| C616, 617 | A1-121-417-00 | (B) 100 50 V |
| C618 | A1-130-141-00 | (A) 0.01 630 V polyethylene |

RESISTORS

All resistors are in ohms. Common $\frac{1}{4}$ W carbon resistors are omitted. Refer to the list on page 27 for their part numbers. All adjustable resistors have characteristic curve B, unless otherwise noted. $k\Omega$: 1000 Ω

| | | |
|-----------|---------------|--|
| R111, 211 | 1-214-150-11 | (A) 5.6 k $\frac{1}{4}$ W(1%) metal oxide |
| R112, 212 | | |
| R113, 213 | 1-214-110-00 | (A) 120 $\frac{1}{4}$ W(1%) metal oxide |
| R118, 218 | A1-211-508-00 | (A) 27 $\frac{1}{4}$ W carbon (nonflammable) |
| R119, 219 | A1-211-522-00 | (A) 100 $\frac{1}{4}$ W carbon (nonflammable) |
| R120, 220 | | |
| R121, 221 | A1-211-518-00 | (A) 68 $\frac{1}{4}$ W carbon (nonflammable) |
| R122, 222 | | |
| R129, 229 | A1-211-490-00 | (A) 4.7 $\frac{1}{4}$ W carbon |
| R130, 230 | | (nonflammable) |
| R135, 235 | A1-211-538-00 | (A) 470 $\frac{1}{4}$ W carbon (nonflammable) |
| R136, 236 | A1-211-522-00 | (A) 100 $\frac{1}{4}$ W carbon (nonflammable) |
| R141, 241 | A1-217-573-00 | 0.33 5 W(2%) wirewound |
| R142, 242 | | (nonflammable) |
| R143, 243 | A1-206-463-00 | (A) 10 2 W metal oxide (nonflammable) |
| R144, 244 | A1-244-825-00 | 10 $\frac{1}{2}$ W carbon |
| R148, 248 | A1-211-514-00 | (A) 47 $\frac{1}{4}$ W carbon (nonflammable) |
| R149, 249 | | |
| R309 | A1-206-648-00 | (A) 220 2 W metal oxide (nonflammable) |
| R401, 402 | A1-217-570-00 | 2.2 5 W metal plate |
| R403 | A1-206-656-00 | (A) 470 2 W metal oxide (nonflammable) |
| R404, 405 | 1-214-150-00 | 5.6 k $\frac{1}{4}$ W(1%) metal oxide |
| R406 | A1-206-657-00 | (A) 510 2 W metal oxide (nonflammable) |

| Ref. No. | Part No. | Description |
|----------|---------------|--|
| R601 | A1-211-490-00 | 4.7 $\frac{1}{4}$ W carbon (nonflammable) (US, Canadian model) |
| R601 | A1-211-514-00 | (A) 47 $\frac{1}{4}$ W carbon (nonflammable) (AEP, UK model) |
| R602 | A1-211-498-00 | 10 $\frac{1}{4}$ W carbon (nonflammable) (US, Canadian model) |
| R602 | A1-211-520-00 | (A) 82 $\frac{1}{4}$ W carbon (nonflammable) (AEP, UK model) |
| R603 | A1-211-514-00 | 47 $\frac{1}{4}$ W carbon (nonflammable) (US, Canadian model) |
| R603 | A1-211-518-00 | (A) 68 $\frac{1}{4}$ W carbon (nonflammable) (AEP, UK model) |
| R604 | A1-211-528-00 | (A) 180 $\frac{1}{4}$ W carbon (nonflammable) |
| R605 | A1-214-596-00 | 39 k 2 W metal oxide (nonflammable) (US, Canadian model) |
| R605 | A1-206-698-00 | (A) 27 k 2 W metal oxide (nonflammable) (AEP, UK model) |
| R606 | A1-214-598-00 | 56 k 1 W metal oxide (nonflammable) (US, Canadian model) |
| R606 | A1-214-595-00 | (A) 100 k 1 W metal oxide (nonflammable) (AEP, UK model) |
| R607 | A1-214-598-00 | 56 k 1 W metal oxide (nonflammable) (US, Canadian model) |
| R607 | A1-214-597-00 | (A) 100 k 2 W metal oxide (nonflammable) (AEP, UK model) |
| R608 | A1-246-470-00 | (A) 1 k $\frac{1}{4}$ W carbon |
| R609 | A1-214-598-00 | 56 k 1 W metal oxide (nonflammable) (US, Canadian model) |
| R609 | A1-214-595-00 | (A) 100 k 1 W metal oxide (nonflammable) (AEP, UK model) |

Note: The components identified by shading and mark are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: Circled letters (A) to (Z) are applicable to European models only.

| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u> | | | |
|-----------------|-----------------|--------------------|-------|--|--|
| R610 | △1-211-945-00 | (A) 2.2 k | 1/4 W | carbon (nonflammable) | |
| R611 | △1-211-532-00 | 270 | 1/4 W | carbon (nonflammable) (US, Canadian model) | |
| R611 | △1-211-544-00 | (A) 820 | 1/4 W | carbon (nonflammable) (AEP, UK model) | |
| R612 | △1-246-517-00 | (A) 68 k | 1/4 W | carbon (AEP, UK model) | |
| R612 | △1-246-521-00 | 100 k | 1/4 W | carbon (US, Canadian model) | |
| R614 | △1-244-927-00 | (A) 180 k | 1/2 W | carbon (AEP, UK model) | |
| R614 | △1-246-517-00 | 68 k | 1/4 W | carbon (US, Canadian model) | |
| R615 | △1-211-553-00 | (A) 2.7 k | 1/4 W | carbon (nonflammable) | |
| R618 | △1-246-479-00 | (A) 1.8 k | 1/4 W | carbon | |
| R619 | △1-246-497-00 | (A) 10 k | 1/4 W | carbon | |
| R620 | △1-246-511-00 | (A) 39 k | 1/4 W | carbon | |
| R621 | △1-246-469-00 | 680 | 1/4 W | carbon (US, Canadian model) | |
| R621 | △1-246-470-00 | (A) 750 | 1/4 W | carbon (AEP, UK model) | |
| R622 | △1-217-156-00 | (B) 0.22 | 5 W | wirewound | |
| R623 | △1-246-449-00 | (A) 100 | 1/4 W | carbon (AEP, UK model) | |
| R623 | △1-246-451-00 | 120 | 1/4 W | carbon (US, Canadian model) | |
| R624 | △1-214-596-00 | 39 k | 2 W | (US, Canadian model) | |
| R624-626 | △1-206-698-00 | (A) 27 k | 2 W | metal oxide (AEP, UK model) | |
| RT101, 201 | 1-224-550-21 | (B) 220 | | adjustable; dc balance | |
| RT102, 202 | 1-224-252-XX | (B) 10 k | | adjustable; class-B dc bias | |
| RT103, 203 | 1-224-248-XX | (B) 470 | | adjustable; class-A dc bias | |
| RT104, 204 | 1-224-641-XX | (B) 470 | | adjustable; class-B amp. | |
| RT601 | △1-224-642-XX | (B) 1 k | | adjustable; dc voltage | |

SWITCHES

| | | |
|----|---------------|---------------------------------------|
| S1 | 1-516-580-00 | (C) Slide, OPERATION |
| S2 | △1-552-689-00 | Rotary, POWER (US, Canadian model) |
| S2 | △1-552-690-00 | (F) Rotary, POWER (AEP, UK model) |

Note: The components identified by shading and mark are critical for safety. Replace only with part number specified.

| <u>Ref. No.</u> | <u>Part No.</u> | <u>Description</u> | |
|-----------------|-----------------|--------------------|--|
|-----------------|-----------------|--------------------|--|

MISCELLANEOUS

| | | |
|------|---------------|-------------------------------------|
| CNP1 | △1-551-238-00 | (I) Cord, power (AEP model) |
| CNP1 | △1-551-421-00 | Cord, power (US, Canadian model) |
| CNP1 | △1-534-820-XX | (F) Cord, power (UK model) |
| F2 | △1-532-350-00 | (B) Fuse, 4AT (AEP, UK model) |
| F2 | △1-532-509-00 | Fuse, 6.3A (US, Canadian model) |

J101, 201 1-507-378-XX (B) Jack, 2 p; DIRECT,
J102, 202 C COUPLED

PL501 1-518-299-91 (B) Lamp, 6 V 35 mA; POWER

RY101, 201 1-515-294-00 (F) Relay

RY102, 202 1-515-302-00 (F) Relay

RY401 △1-515-278-00 Relay (US, Canadian model)

RY401 △1-515-278-00 (F) Relay (AEP, UK model)

RY601 △1-515-127-XX (I) Relay

TM101 1-535-195-21 (F) Terminal Strip, 2 p; SPEAKER
(white)

TM201 1-535-195-31 (F) Terminal Strip, 2 p; SPEAKER
(red)

1-517-072-00 Holder, lamp (US, Canadian model)

1-525-186-00 (B) Socket, transistor

1-533-131-00 (A) Holder, fuse

Note: Les composants identifiés par un trame et une marque sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: Circled letters (**A** to **Z**) are applicable to European models only.

ACCESSORIES AND PACKING MATERIALS

| <u>Part No.</u> | <u>Description</u> |
|-----------------|---|
| 3-701-202-00 | (A) Bag, check sheet |
| 3-770-353-11 | (F) Manual, instruction (AEP, UK model) |
| 3-770-353-21 | Manual, instruction (US, Canadian model) |
| 3-794-233-21 | Sheet (US model) |
| 3-794-301-31 | Sheet, instruction (Canadian model) |
| 4-809-251-00 | (A) Bag, plastic |
| 4-854-019-00 | (C) Cushion |
| 4-854-024-00 | (F) Carton (AEP, UK model) |
| 4-854-025-00 | (B) Sub-cushion (AEP, UK model) |
| 4-854-026-00 | Carton (US, Canadian model) |

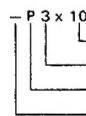
1/4 WATT CARBON RESISTORS A

Note: Circled letter A is applicable to European models only.

| Ω | Part No. |
|----------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|----------|--------------|
| 1.0 | 1-246-401-00 | 10 | 1-246-425-00 | 100 | 1-246-449-00 | 1.0k | 1-246-473-00 | 10k | 1-246-497-00 | 100k | 1-246-521-00 |
| 1.1 | 1-246-402-00 | 11 | 1-246-426-00 | 110 | 1-246-450-00 | 1.1k | 1-246-474-00 | 11k | 1-246-498-00 | 110k | 1-246-522-00 |
| 1.2 | 1-246-403-00 | 12 | 1-246-427-00 | 120 | 1-246-451-00 | 1.2k | 1-246-475-00 | 12k | 1-246-499-00 | 120k | 1-246-523-00 |
| 1.3 | 1-246-404-00 | 13 | 1-246-428-00 | 130 | 1-246-452-00 | 1.3k | 1-246-576-00 | 13k | 1-246-500-00 | 130k | 1-246-524-00 |
| 1.5 | 1-246-405-00 | 15 | 1-246-429-00 | 150 | 1-246-453-00 | 1.5k | 1-246-577-00 | 15k | 1-246-501-00 | 150k | 1-246-525-00 |
| 1.6 | 1-246-406-00 | 16 | 1-246-430-00 | 160 | 1-246-454-00 | 1.6k | 1-246-578-00 | 16k | 1-246-502-00 | 160k | 1-246-526-00 |
| 1.8 | 1-246-407-00 | 18 | 1-246-431-00 | 180 | 1-246-455-00 | 1.8k | 1-246-579-00 | 18k | 1-246-503-00 | 180k | 1-246-527-00 |
| 2.0 | 1-246-408-00 | 20 | 1-246-432-00 | 200 | 1-246-456-00 | 2.0k | 1-246-580-00 | 20k | 1-246-504-00 | 200k | 1-246-528-00 |
| 2.2 | 1-246-409-00 | 22 | 1-246-433-00 | 220 | 1-246-457-00 | 2.2k | 1-246-581-00 | 22k | 1-246-505-00 | 220k | 1-246-529-00 |
| 2.4 | 1-246-410-00 | 24 | 1-246-434-00 | 240 | 1-246-458-00 | 2.4k | 1-246-582-00 | 24k | 1-246-506-00 | 240k | 1-246-530-00 |
| 2.7 | 1-246-411-00 | 27 | 1-246-435-00 | 270 | 1-246-459-00 | 2.7k | 1-246-583-00 | 27k | 1-246-507-00 | 270k | 1-246-531-00 |
| 3.0 | 1-246-412-00 | 30 | 1-246-436-00 | 300 | 1-246-460-00 | 3.0k | 1-246-584-00 | 30k | 1-246-508-00 | 300k | 1-246-532-00 |
| 3.3 | 1-246-413-00 | 33 | 1-246-437-00 | 330 | 1-246-461-00 | 3.3k | 1-246-585-00 | 33k | 1-246-509-00 | 330k | 1-246-533-00 |
| 3.6 | 1-246-414-00 | 36 | 1-246-438-00 | 360 | 1-246-462-00 | 3.6k | 1-246-586-00 | 36k | 1-246-510-00 | 360k | 1-246-534-00 |
| 3.9 | 1-246-415-00 | 39 | 1-246-439-00 | 390 | 1-246-463-00 | 3.9k | 1-246-587-00 | 39k | 1-246-511-00 | 390k | 1-246-535-00 |
| 4.3 | 1-246-416-00 | 43 | 1-246-440-00 | 430 | 1-246-464-00 | 4.3k | 1-246-488-00 | 43k | 1-246-512-00 | 430k | 1-246-536-00 |
| 4.7 | 1-246-417-00 | 47 | 1-246-441-00 | 470 | 1-246-465-00 | 4.7k | 1-246-489-00 | 47k | 1-246-513-00 | 470k | 1-246-537-00 |
| 5.1 | 1-246-418-00 | 51 | 1-246-442-00 | 510 | 1-246-466-00 | 5.1k | 1-246-490-00 | 51k | 1-246-514-00 | 510k | 1-246-538-00 |
| 5.6 | 1-246-419-00 | 56 | 1-246-443-00 | 560 | 1-246-467-00 | 5.6k | 1-246-491-00 | 56k | 1-246-515-00 | 560k | 1-246-539-00 |
| 6.2 | 1-246-420-00 | 62 | 1-246-444-00 | 620 | 1-246-468-00 | 6.2k | 1-246-492-00 | 62k | 1-246-516-00 | 620k | 1-246-540-00 |
| 6.8 | 1-246-421-00 | 68 | 1-246-445-00 | 680 | 1-246-469-00 | 6.8k | 1-246-493-00 | 68k | 1-246-517-00 | 680k | 1-246-541-00 |
| 7.5 | 1-246-422-00 | 75 | 1-246-446-00 | 750 | 1-246-470-00 | 7.5k | 1-246-494-00 | 75k | 1-246-518-00 | 750k | 1-246-542-00 |
| 8.2 | 1-246-423-00 | 82 | 1-246-447-00 | 820 | 1-246-471-00 | 8.2k | 1-246-495-00 | 82k | 1-246-519-00 | 820k | 1-246-543-00 |
| 9.1 | 1-246-424-00 | 91 | 1-246-448-00 | 910 | 1-246-472-00 | 9.1k | 1-246-496-00 | 91k | 1-246-520-00 | 910k | 1-246-544-00 |

HARDWARE NOMENCLATURE

Screw:



L: Length in mm
D: Diameter in mm
Type of head
Indicated slotted-head only.

Unless otherwise indicated, it means cross-recessed head (Phillips type).

Nut, Washer, Retaining ring:



N 3
Diameter of usable screw or shaft
Reference designation

| Reference Designation | Shape | Description | Remarks |
|-----------------------|-------|---|--|
| SCREWS | | | |
| P | | pan-head screw | binding-head (B) screw for replacement |
| PWH | | pan-head screw with washer face | binding-head (B) screw and flat washer for replacement |
| PS PSP | | pan-head screw with spring washer | binding-head (B) screw and spring washer for replacement |
| PSW PSPW | | pan-head screw with spring and flat washers | binding-head (B) screw and spring and flat washers for replacement |
| R | | round-head screw | binding-head (B) screw for replacement |
| K | | flat-countersunk-head screw | |
| RK | | oval-countersunk-head screw | |
| B | | binding-head screw | |
| T | | truss-head screw | binding-head (B) screw for replacement |
| F | | flat-fillister-head screw | |
| RF | | fillister-head screw | |
| BV | | braizer-head screw | |

| Reference Designation | Shape | Description | Remarks |
|----------------------------|-------|--|---|
| SELF-TAPPING SCREWS | | | |
| TA | | self-tapping screw | ex: TA, P 3 x 10 |
| PTP | | pan-head self-tapping screw | binding-head self-tapping (TA, B) screw for replacement |
| PTPWH | | pan-head self-tapping screw with washer face | binding-head self-tapping (TA, B) screw and flat washer for replacement |
| PTTWH | | pan-head thread-rolling screw with washer face | binding-head (B) screw and flat washer for replacement |
| SET SCREWS | | | |
| SC | | set screw | |
| SC | | hexagon-socket set screw | ex: SC 2.6 x 4, hexagon socket |
| NUT | | | |
| N | | nut | |
| WASHERS | | | |
| W | | flat washer | |
| SW | | spring washer | |
| LW | | internal-tooth lock washer | ex: LW3, internal |
| LW | | external-tooth lock washer | ex: LW3, external |
| RETAINING RINGS | | | |
| E | | retaining ring | |
| G | | grip-type retaining ring | |